SWMU 19 AND 20 GEOPHYSICAL REPORT

EARTH RESOURCES TECHNOLOGY, INC.

March 1, 2002

Amanda DeSantis
Montgomery Watson Harza, Inc.
335 Phoenixville Pike
Malvern, PA 19355

Re: Results of Geophysical Surveys
Honeywell International Facility
Claymont, DE

Dear Amanda:

Earth Resources Technology, Inc. (ERT) performed electromagnetic (EM) and GPR surveys at the above referenced site on Wednesday, February 27, 2002. These surveys were conducted at two separate sites to determine the locations of specific features and targets. EM surveys were conducted at Solid Waste Management Units (SWMUs) 19 and 20. The EM surveys were conducted to determine the location of buried metallic objects such as gas cylinders and under ground storage tanks (USTs). The GPR surveys were conducted at SWMUs 19 and 20 to better define any anomalies that were located during the EM survey. The goal of the GPR survey was to better define the location and depths of the buried objects.

1.0 Principle And Instrumentation

The Geonics EM31 was used for the electromagnetic survey. The EM31 measures the changes in the ground conductivity using a patented electromagnetic inductive technique that makes the measurements without electrodes or ground contact. The unit of conductivity used is millisiemens per meter (mS/m). Conductivity changes are used to infer the geological variations, or groundwater contamination. The EM31 has two analog meters, which display the quadrature-phase (conductivity) and inphase components, respectively. Inphase measurements are the ratio of the induced secondary magnetic field to the primary magnetic field in parts per thousand (ppt). The inphase component is especially useful for searching for buried metal drums, pipes, and other ferrous and non-ferrous metallic debris. The effective depth of exploration of the equipment is about twenty (20) ft.

The pulseEKKO 1000 radar from Sensors & Software, Inc. was used to conduct the GPR survey. During the survey, the device radiates a 450 MHz electromagnetic wave from a transmitter antenna into the earth and receives at a receiving antenna the reflection of the wave from subsurface interfaces at which changes in the electrical properties (dielectric permittivity and electrical conductivity) of the subsurface materials occur. Dielectric permittivity controls wave speed; and conductivity determines the signal attenuation. Radar reflections occur when the radio waves encounter a change in the velocity or attenuation. The bigger the change in properties the more signal reflected. These properties are sometimes controlled by water in the material, hence by the porosity and quantity of dissolved solids in the water. Metallic objects usually exhibit strong subsurface reflection character due to their high electrical impedance, or contrast, versus surrounding soil or fill. Depth of penetration of the radar signal is inversely proportional to the

conductivity of the soil. As a result, electrically resistive earth materials such as coarse-grained, unsaturated sediments allow a deeper radar penetration than the conductive finer-grained soils such as clay and silt. Similarly, reinforced concrete and shallow groundwater are conductive and thus attenuate the radar signals.

2.0 SHMU 19

2.1 Field Design and Operation

The goal of the survey was to locate areas within a pre-determined site that may contain buried metallic objects such as gas cylinders and USTs. The suspect grid for SHMU 19 is located near the BF3 plant area. The area was for the most part was paved asphalt and flat with minor immovable obstructions. As shown in Figure 1, the survey was conducted along a grid that was based on a Cartesian coordinate system with fiducial marks every 5 ft. The grid was 45 ft by 325 ft. For example, the origin of the coordinate system on the grid is located adjacent to the railroad tracks in the northwest corner of the designated site and has the coordinates {100, 100}. During the data collection, the EM31 was set in a manual mode with readings collected at 5-ft centers along each survey line in both quadrature-phase and inphase.

Figure 2 shows the location of the GPR survey lines. The inphase contour map (discussed at Section 2.2) is shown here as background. The collection of the GPR data was performed by pulling the antenna along each grid line while the positions of each radar reading were recorded with an odometer attached to a survey wheel. The odometer was set up such that one radar reading would be acquired every 0.05 m (0.164 ft). Because the subject property is underlain by the artificial fill or clay/silt/sand, the average velocity of the radar is estimated around 0.1 m (0.328 ft) per nanosecond (ns). The time range was thus selected as 70 ns and would allow a penetration depth of about 10 ft. The GPR data were recorded digitally in a portable computer for instant display and subsequent processing.

2.2 Results and Interpretations

In Figure 3, the EM anomalies are shown with the highest readings in orange and the lowest readings in blue. Background readings fall between the orange and blue colors. Note that the low or high conductivity/inphase values are not absolute, but relative, reflecting a deviation from the background values. The positive or negative values reflect the change of the dipole orientation of the local electromagnetic field. Both the high and low deviations are used to locate buried materials. There are several large anomalies in the grid area that is associated with known surface features. Anomaly E along the north edge of Figure 3 is associated with the railroad tracks on the property. Anomaly F of Figure 3 is associated with a large tank on the ground surface. Anomaly G of Figure 3 is associated with large trucks on the property. There are several anomalous readings that show up on Figure 3 that cannot be accounted for by surface features and therefore are areas of concern for buried metallic objects. Anomaly A of Figure 3 is in the area of concern for a suspected UST. Anomalies B and C are linear anomalies and may represent possible underground pipelines. Anomaly B may correspond to one utility but C to two utility lines. Anomaly D may be another area of concern for buried metallic objects.

Figures 4 through 7 present several selected GPR profiles that were acquired during the geophysical survey (see Figure 2 for their locations). Along these GPR profiles, the horizontal axis represents the horizontal distance in ft; while the left vertical axis represents the two-way travel time in ns and the right vertical axis the depth in ft (converted using the assumed velocity of 0.328 ft/ns). A GPR profile is made of individual traces that have peaks and valleys. The peaks of radar signals represent different interfaces

in the subsurface encountered by the penetrating signals. Connecting and coloring the peaks and valleys of successive traces creates a GPR profile. As shown in the profiles, the red reflections represent the peaks of individual traces with the highest amplitudes; while the blue reflections are the valleys of individual traces with the lowest amplitudes. The red color is replaced by dark gray of varying degrees for the lower peak amplitudes; and the blue by white for varying degrees of higher valley amplitudes. The red and blue reflections, as discussed in Section 1.0, are created by interfaces with higher dielectric contrasts.

Figure 4 shows GPR profile A-A' that was acquired across EM anomaly A and B. Corresponding to Anomaly A, strong, "ringing" but flat reflections occur at the distances between 18 ft and 28 ft at the depth of 2 ft. On top of the "ringing" reflections is a reflector typical of a reinforced concrete slab. Corresponding to Anomaly B is a hyperbolic reflector typical of a pipe at the distance of 39 ft at the depth of 2 ft. In addition, strong but somewhat chaotic reflections occur at the depths less than 2 ft at the distances between 3 ft and 15 ft, between 28.5 ft and 35 ft, and between 49 ft and 56 ft, respectively. These reflections are typical of buried debris or foundations.

Profile B-B' crossed EM anomaly A in the direction perpendicular to A-A' (Figure 5). Beneath a reinforced concrete slab, ringing but flat reflections occur between 18 ft and 27 ft at the depth of 2 ft. The reflections correspond in location to Anomaly A and the ringing reflections on A-A'. The ringing reflections may represent the suspected UST. However, the flat characteristics of the reflections suggest that they may represent a foundation structure unless the UST has a flat top surface. A weak hyperbolic reflector is also identified on B-B' at the distance of 3 ft at the depth of 1 ft.

Figure 6 presents two GPR profiles, C-C' and D-D' acquired across EM anomaly D. Strong, ringing and flat reflections occur on both profiles with concrete slabs on the top. These reflections are similar to the ringing reflections on A-A' and B-B'. They may represent a possible flattop UST or foundation structure. Profile E-E' ran across linear EM anomaly C (Figure 7). Two pipe-like reflectors are identified at the locations corresponding to Anomaly C. Ringing reflectors are also identified near the end of E-E' and may represent foundations.

In order to interpret the 2-dimensional, vertical GPR profile data in a 3-dimensional perspective, EKKO Mapper Software, developed by Sensors and Software was used. Using this software, GPR profiles are gridded and the data gaps between grid lines are extrapolated. A 3-D block is created from this data. The 3-D block can be viewed and displayed as time or depth slices. Each slice takes the form of a contour map of reflection amplitudes. Figure 8 shows two timeslices of the data set. The colors on the maps show averaged, enveloped amplitudes of radar reflections over an interval of two-way travel time (in nannoseconds, or ns) of the radar signal. Migration, noise filtering, and background subtraction were also applied to the data sets. Many timeslices (1 to 2 ns, 2 to 3 ns,..., 14 to 15 ns) were created and analyzed by ERT, but only two are shown in this report (others did not show anything significantly different from these two). Site features and the grid are also shown.

Figure 8 shows five areas of concern labeled GA, GB, GC, GD, and GE. Anomaly GA represents the strong but chaotic reflections at the distances between 3 ft and 15 ft. Based on the fact that the areas of strong amplitude (white) constitute a narrow strip enclosing a square, the anomaly may represent foundation walls. Anomaly GB corresponds to the ringing reflections identified on A-A' (Figure 4) and B-B' (Figure 5). Because it is located in the area of concern of a possible UST and there is a corresponding EM anomaly (A), the anomaly may represent a UST that has a flat top surface. Anomaly GC is a linear anomaly and corresponds to the pipe reflector identified on A-A'. Its location matches that of EM anomaly B. The anomaly most likely represents a utility line. Anomaly GD corresponds to the strong but chaotic reflections at the distances between 49 and 56 ft on A-A' (Figure 4). It may represent buried debris or abandoned foundation. Anomaly GE does not have any corresponding GPR profile on

display. However, the review of the GPR profiles in this area reveals strong but chaotic reflections. Therefore, the anomaly may represent an area with abandoned foundation or buried debris.

3.0 SHMU 20

3.1 Field Design and Operation

The goal of the survey was to locate areas within a pre-determined site that may contain buried metallic objects such as gas cylinders and USTs. The suspect area for SHMU 20 is located near the BF3 plant area. The area was for the most part was paved asphalt and flat with minor immovable obstructions. As shown in Figure 9, the survey was conducted along a grid that was based on a Cartesian coordinate system with fiducial marks every 5 ft. The grid for the EM survey was 80 ft by 60 ft. During the data collection, the EM31 was set in a manual mode with readings collected at 5-ft centers along each survey line in both quadrature-phase and inphase.

The GPR grid extended another 15 ft to the east of the EM grid (Figure 10). This was done to cover an anomaly identified with the GPR on the eastern edge of the original EM grid. The inphase contour map was also shown on the map as background. The collection of the GPR data was performed by pulling the antenna along each grid line while the positions of each radar reading were recorded with an odometer attached to a survey wheel. The odometer was set up such that one radar reading would be acquired every 0.05 m (0.164 ft). Because the subject property is underlain by the artificial fill or clay/silt/sand, the average velocity of the radar is estimated around 0.1 m (0.328 ft) per nanosecond (ns). The time range was thus selected as 70 ns and would allow a penetration depth of about 10 ft. The GPR data were recorded digitally in a portable computer for instant display and subsequent processing.

3.2 Results and Interpretations

In Figure 11, the EM anomalies are shown with the highest readings in orange and the lowest readings in blue. There are several large anomalies in the grid area that is associated with known surface features. Anomaly C along the north edge of Figure 11 is associated with trucks on the property. Anomaly B of Figure 11 is associated with a concrete pad on the ground surface. Anomaly A shows up as anomalous readings on both the quadrature and in-phase maps and can not be explained by any surface features.

Figures 12 and 13 present GPR profiles that were acquired during the geophysical survey. The location of the GPR profiles are shown in Figure 10 and labeled as A-A' and B-B'. Both profiles crossed EM anomaly A. On profile A-A' (Figure 12) there are strong reflections form 0 ft to 26 ft representing disturbed areas at a depth of 2 ft to 3 ft. The concrete pad at the end of A-A' also creates strong reflections. On profile B-B' (Figure 13), the strong reflections from 0 ft to 32 ft correspond to the strong reflections representing disturbed areas as identified on A-A'. The reflections occur at the depth from 1 to 3 ft. These strong reflections on both A-A' and B-B' appear to be continuous and therefore may not represent isolated objects. They may be buried material laid out as layers. A pipe-like reflector is also identified on B-B' at a distance of 85 ft and a depth of 2 ft. In addition, Figure 13 shows that there is a relatively undisturbed area from 33 ft to 78 ft where no material is buried. Strong reflections occur less than 2 ft in depth at the end of B-B'.

Figure 14 presents four GPR time slice maps (0-5, 5-10, 10-15, and 15-20ns) of the area of concern for SWMU 20. This figure is used to show how the average amplitude changes with depth. These figures show four areas of concern labeled GF, GG, GH, and GI. Anomaly GF encompasses the bottom third of all the maps and shows the highest amplitude reflections of the surveyed area. The anomaly corresponds to the areas labeled as "Disturbed Area?" on Figure 12 and Figure 13. This feature shows up best on

maps B and C and represents an area of concern for buried material. Because this area corresponds to EM anomaly A, it may represent a landfill material.

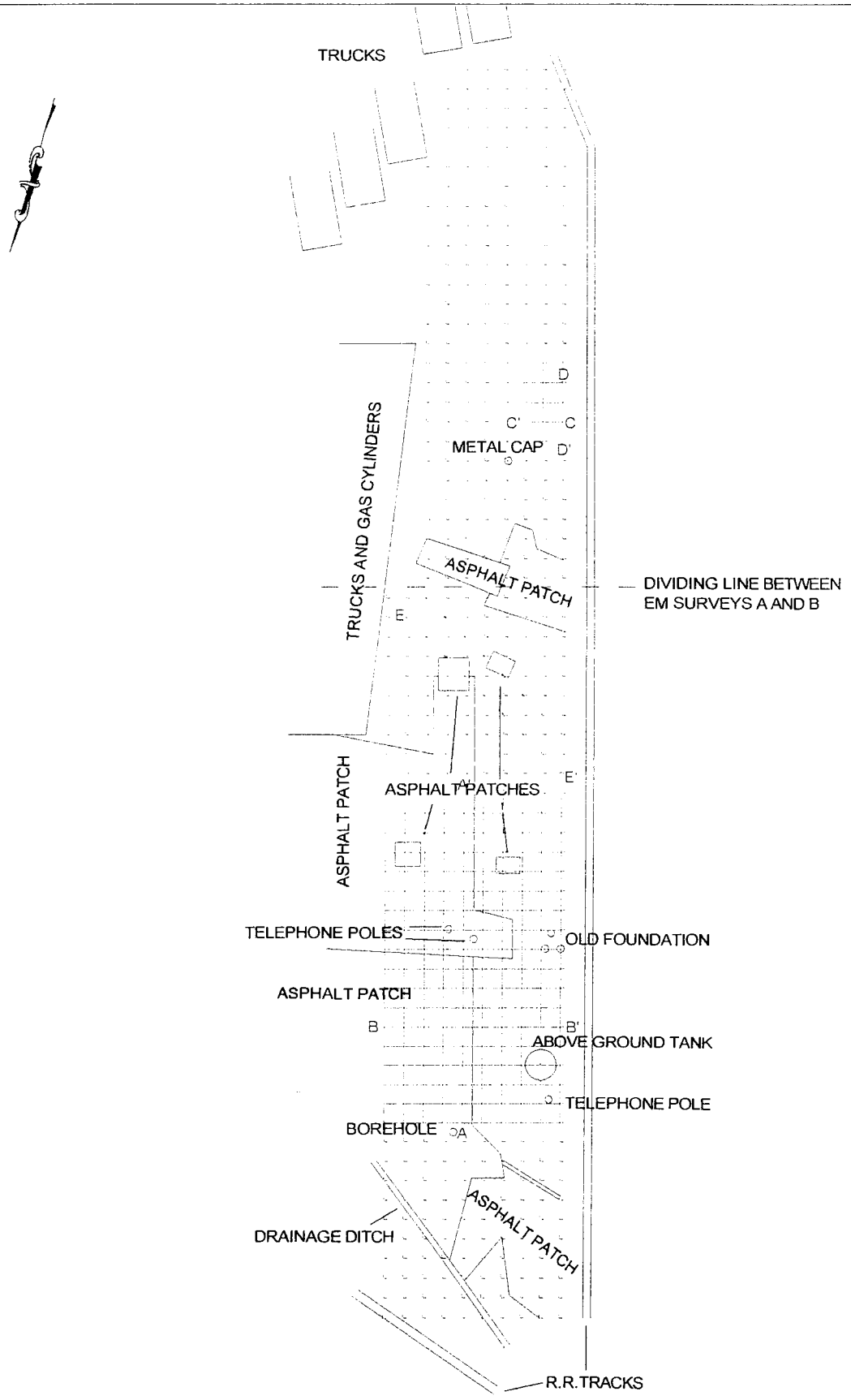
Anomaly GG is associated with the known concrete pad (Figure 14). Anomaly GH refers to the two linear features that cross the surveyed area and are linked to two metal grates. This anomaly most likely represents buried pipes. Anomaly GI that shows up best on Map B corresponds to the strong reflections observed at the end of B-B' and may be an area of concern for buried objects.

4.0 CLOSING

The field procedures and interpretative methodologies used in this project are consistent with standard, recognized practices in similar geophysical investigations. The correlation of geophysical responses with probable subsurface features is based on the past results of similar surveys although it is possible that some variation could exist at this site. This warranty is in lieu of all other warranties either implied or expressed. **ERT** assumes no responsibility for interpretations made by others based on work performed by, or recommendations made by, **ERT.**

Sincerely,
Earth Resources Technology, Inc.

Peter H. Li, Ph.D., P.G.
Principal Geophysicist



SWMU 19 SITE MAP

HONEYWELL INTERNATIONAL

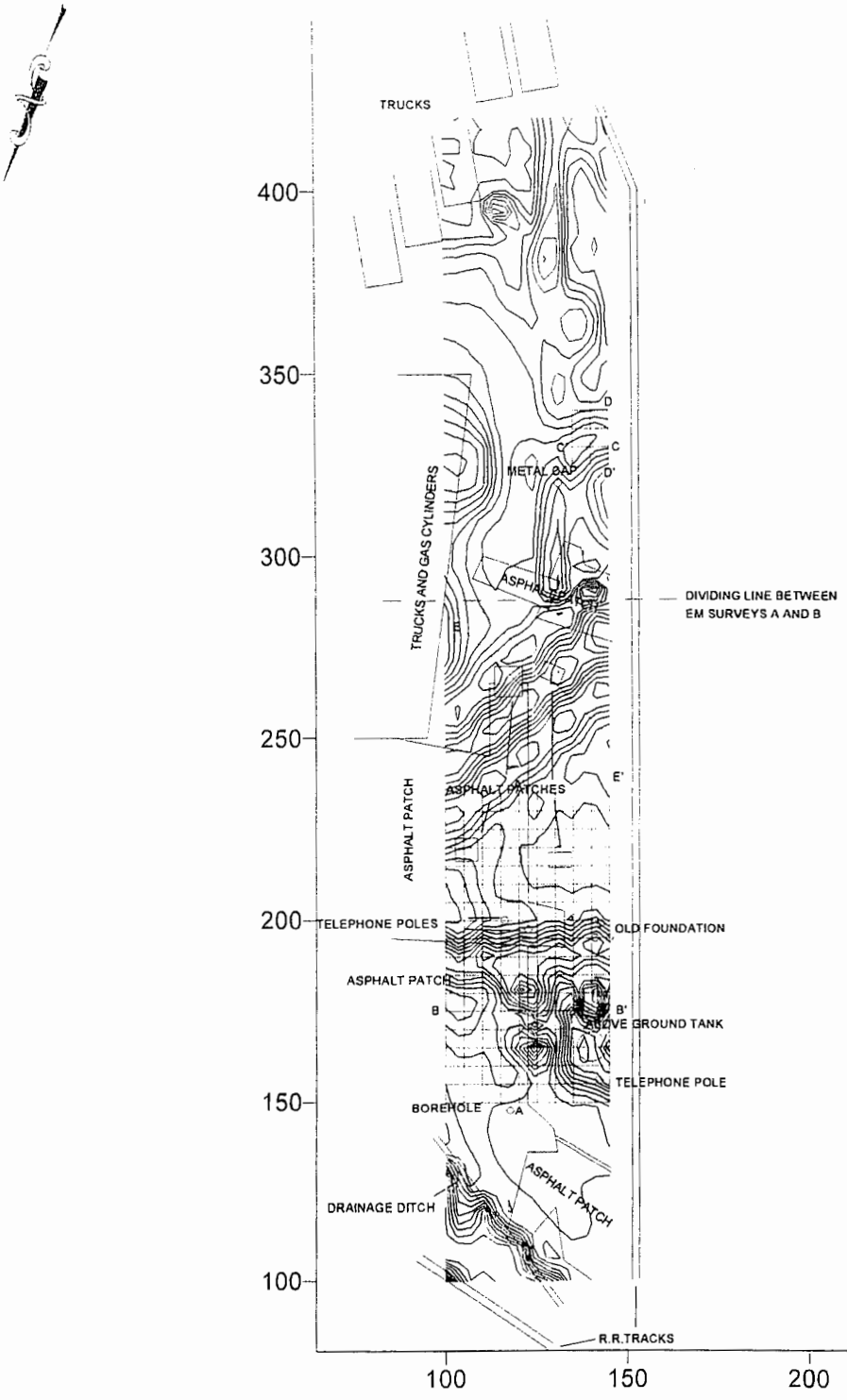
CLAYMONT, DE PLANT

EARTH RESOURCES TECHNOLOGY

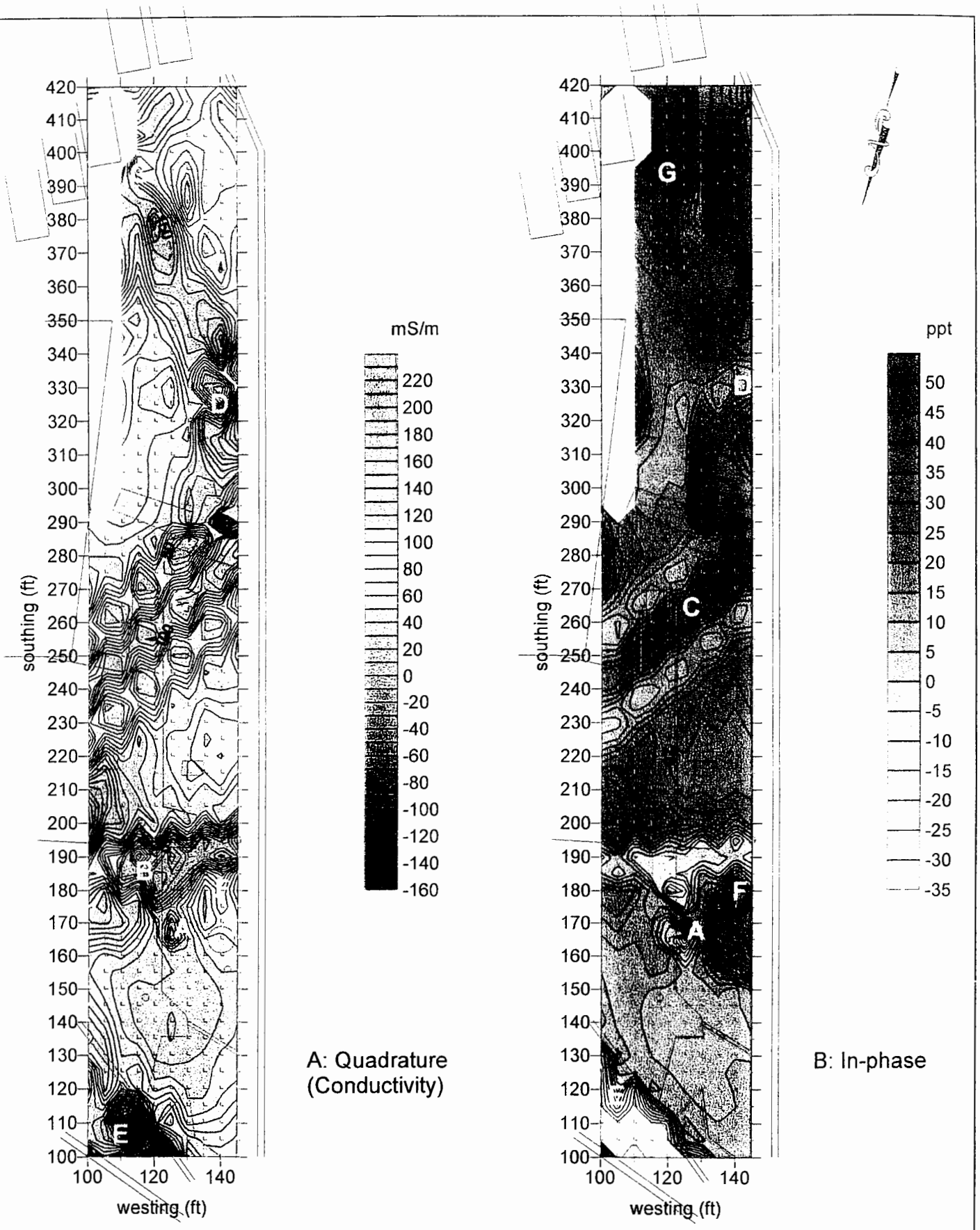
FIGURE 1

SCALE: 1" = 50'

MARCH 1, 2002



SWMU 19 GPR LINES HONEYWELL INTERNATIONAL CLAYMONT, DE PLANT	EARTH RESOURCES TECHNOLOGY	
FIGURE 2	SCALE 1" = 50"	MARCH 1, 2002



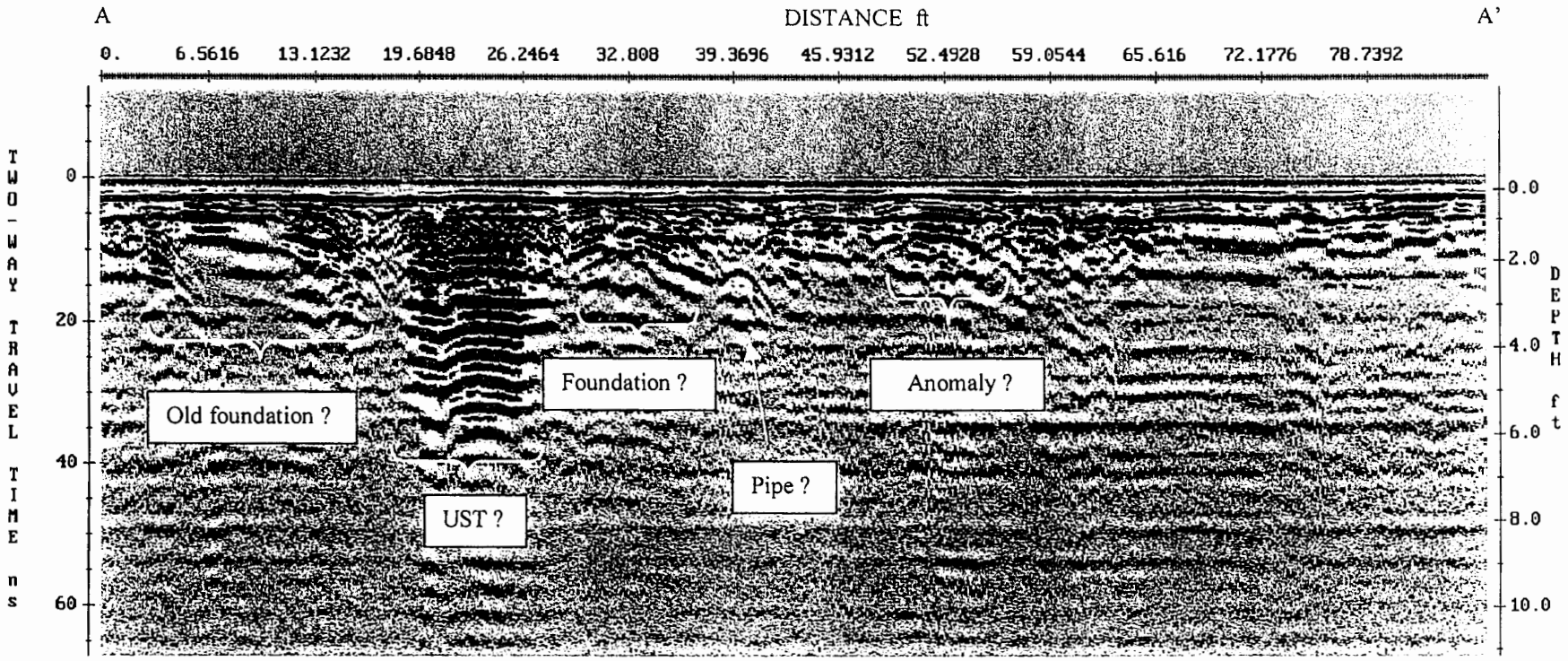
ELECTROMAGNETIC CONTOUR MAPS
SWMU #19
HONEYWELL INTERNATIONAL
CLAYMONT, DE PLANT

EARTH RESOURCES TECHNOLOGY

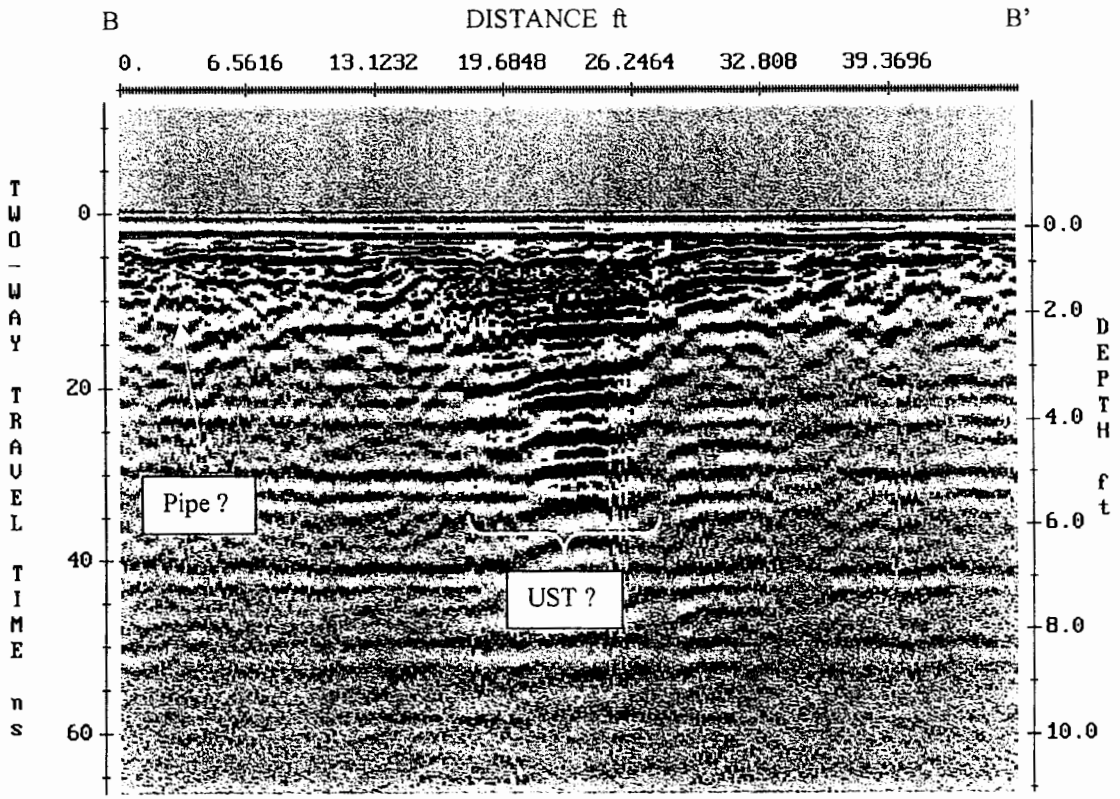
FIGURE 3

SCALE: 1" = 40'

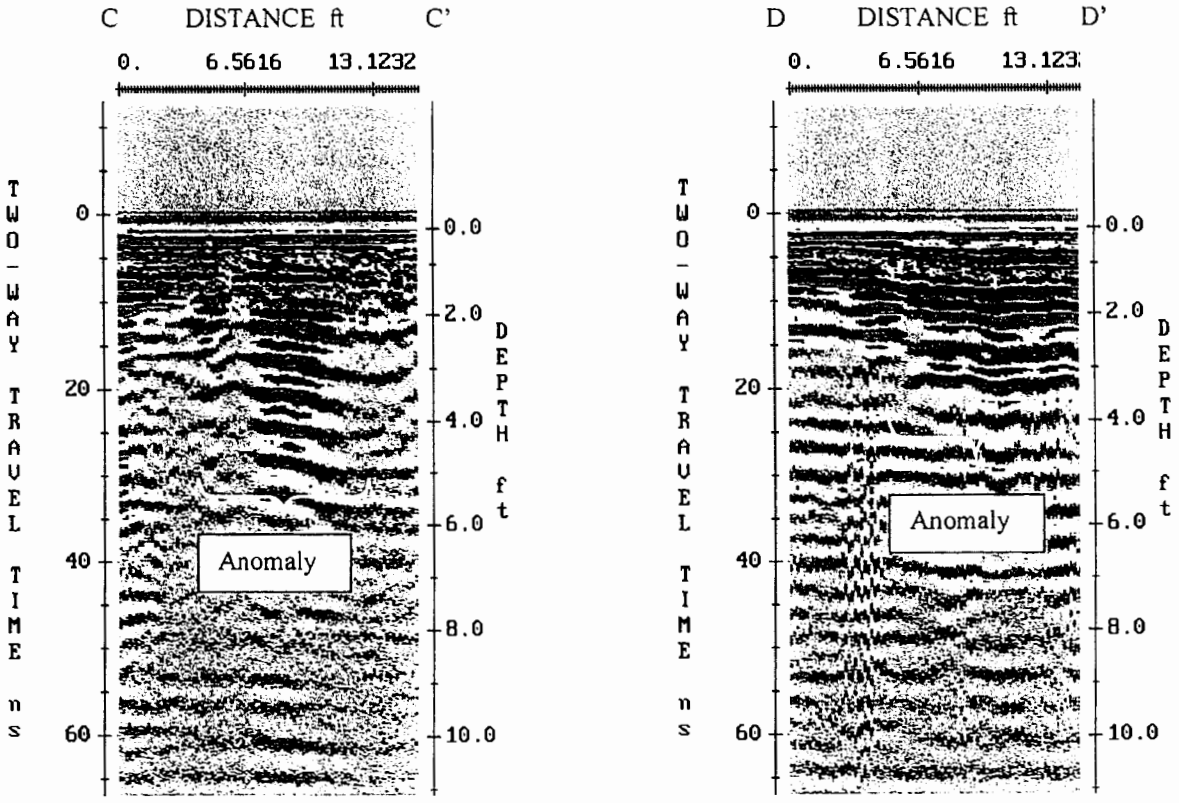
MARCH 1, 2002



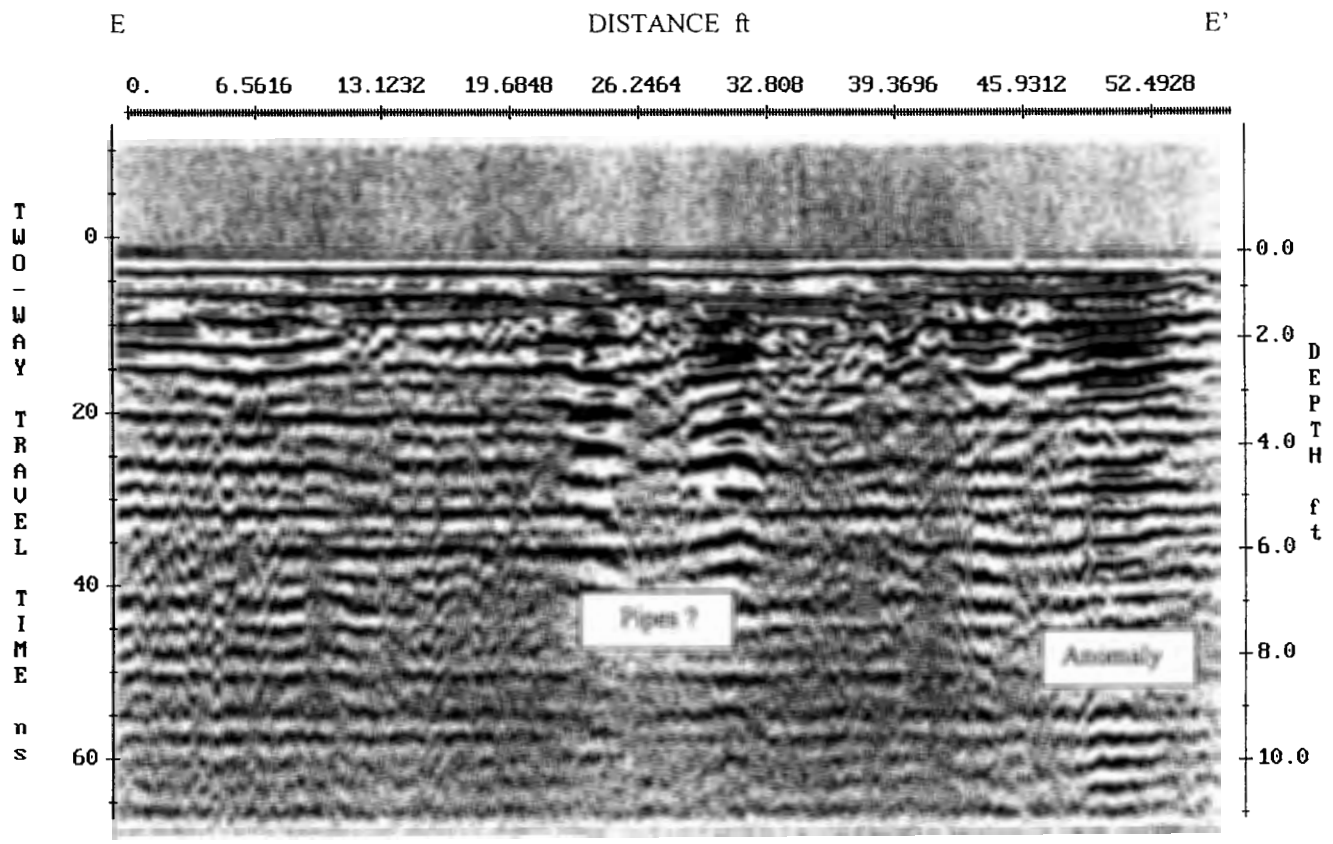
EARTH RESOURCES TECHNOLOGY	GPR PROFILE A-A' SWMU 19 GPR SURVEY HONEYWELL INTERNATIONAL PLANT CLAYMONT, DE	FIGURE 4
SCALE AS SHOWN		MARCH 1, 2002



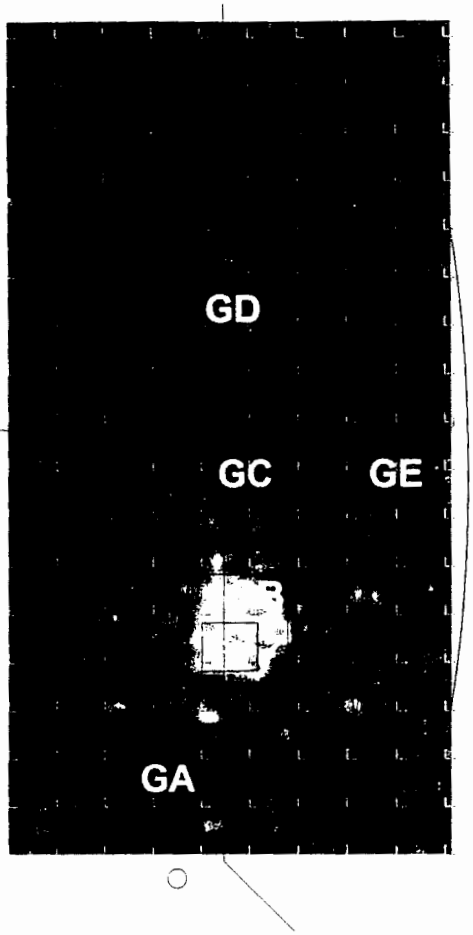
ERT EARTH RESOURCES TECHNOLOGY	GPR PROFILE B-B' SWMU 19 GPR SURVEY HONEYWELL INTERNATIONAL PLANT CLAYMONT, DE	FIGURE 5
SCALE AS SHOWN		MARCH 1, 2002



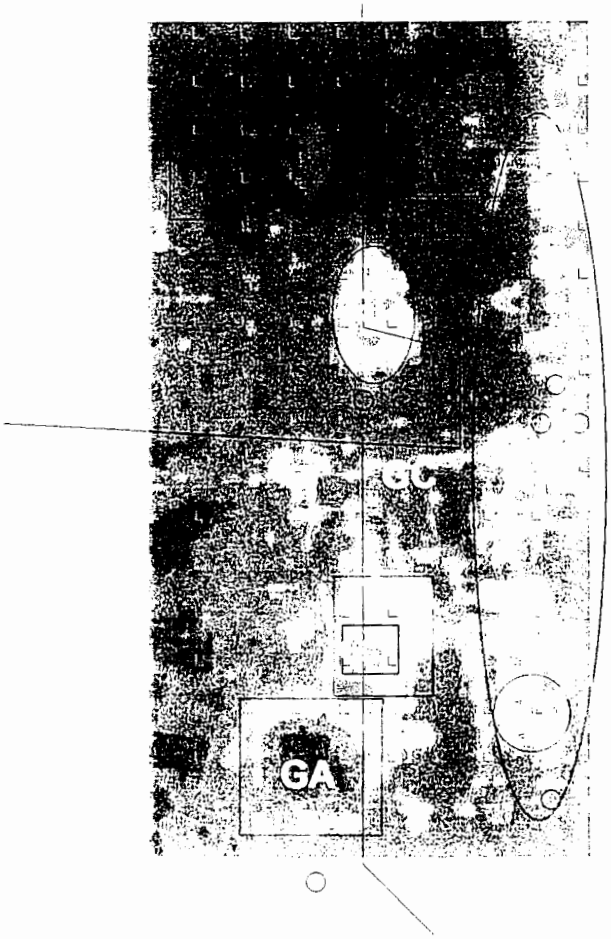
EARTH RESOURCES TECHNOLOGY	GPR PROFILES C-C' AND D-D' SWMU 19 GPR SURVEY HONEYWELL INTERNATIONAL PLANT CLAYMONT, DE	FIGURE 6
SCALE AS SHOWN		MARCH 1, 2002



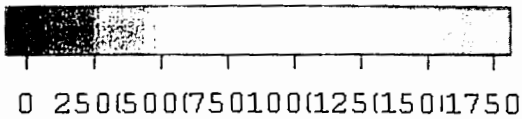
EARTH RESOURCES TECHNOLOGY	GPR PROFILE E-E' SWMU 19 GPR SURVEY HONEYWELL INTERNATIONAL PLANT CLAYMONT, DE	FIGURE 7
SCALE AS SHOWN		MARCH 1, 2002



A. AVERAGE AMPLITUDE 0-10ns

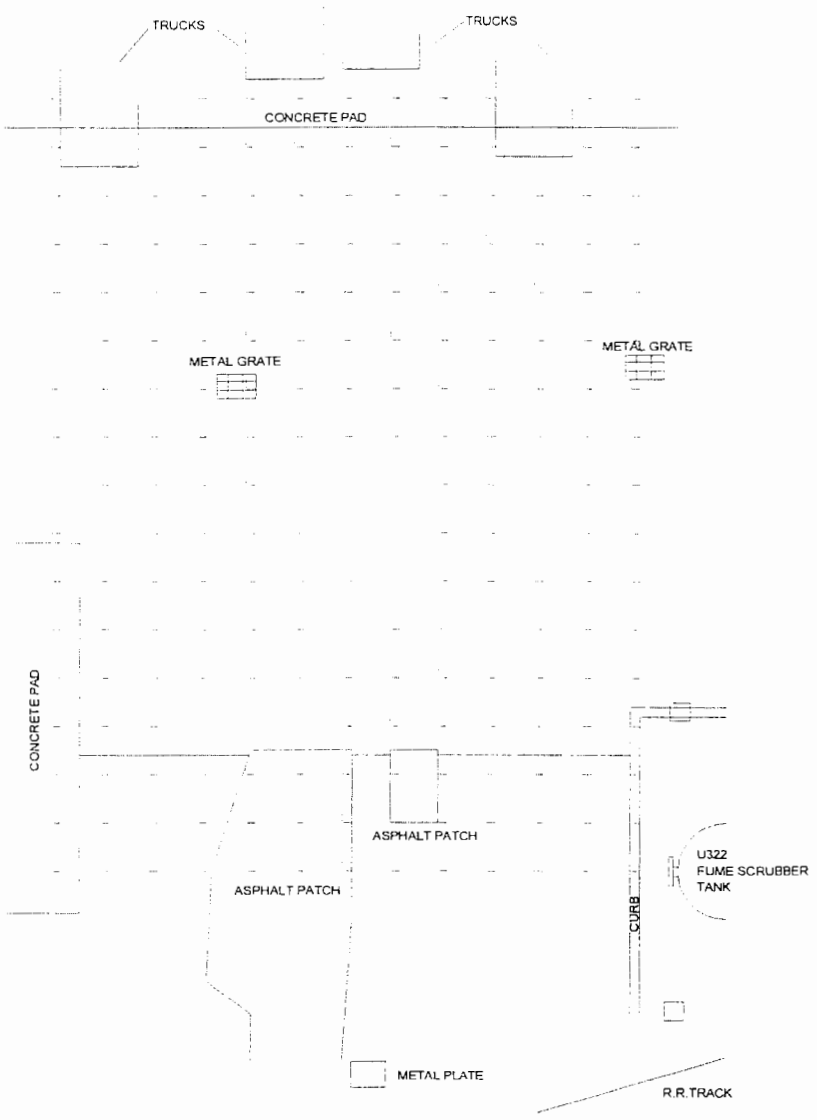


B. AVERAGE AMPLITUDE 10-20ns



AVERAGE AMPLITUDE (mV)

GPR TIME SLICE MAP 10-20 ns SWMU 19 HONEYWELL INTERNATIONAL CLAYMONT, DE PLANT	EARTH RESOURCES TECHNOLOGY	
FIGURE 8	SCALE 1" = 20'	MARCH 1, 2002



SWMU 20 SITE MAP

HONEYWELL INTERNATIONAL

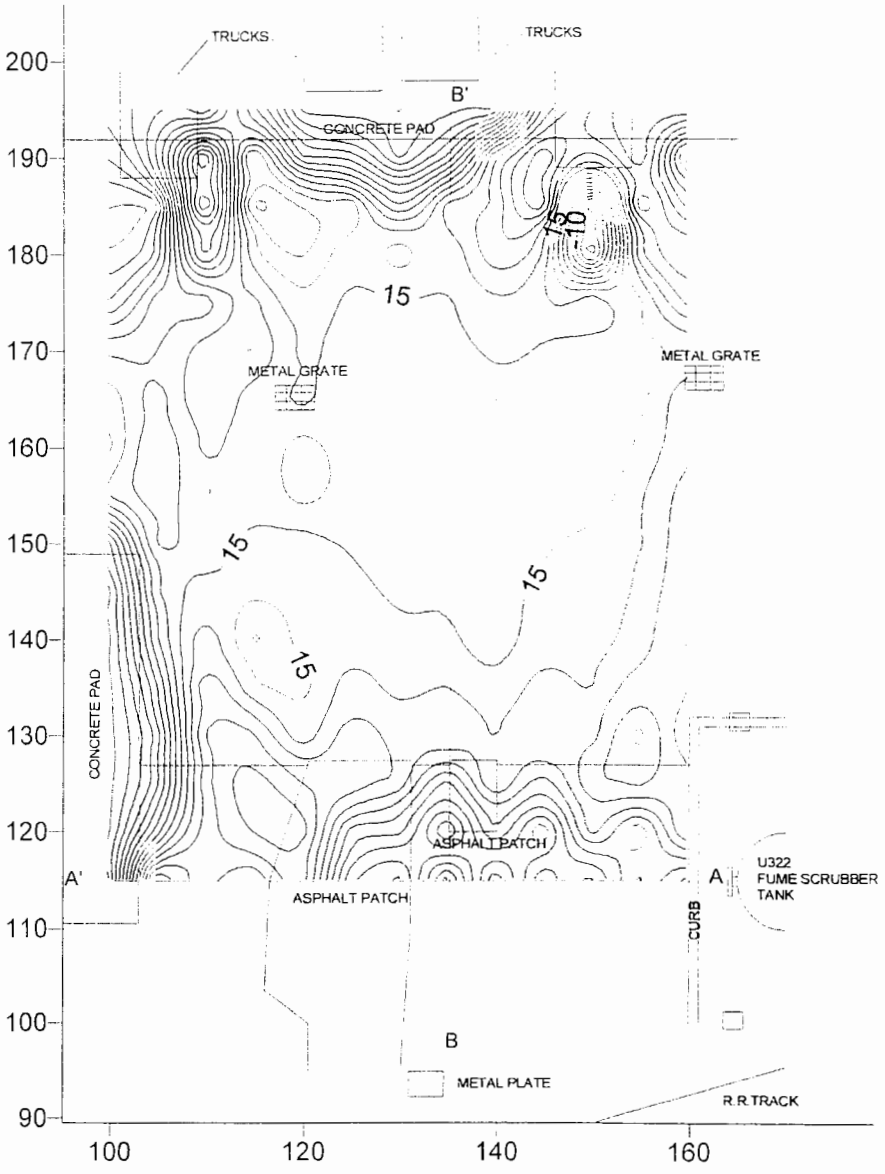
CLAYMONT, DE PLANT

EARTH RESOURCES TECHNOLOGY

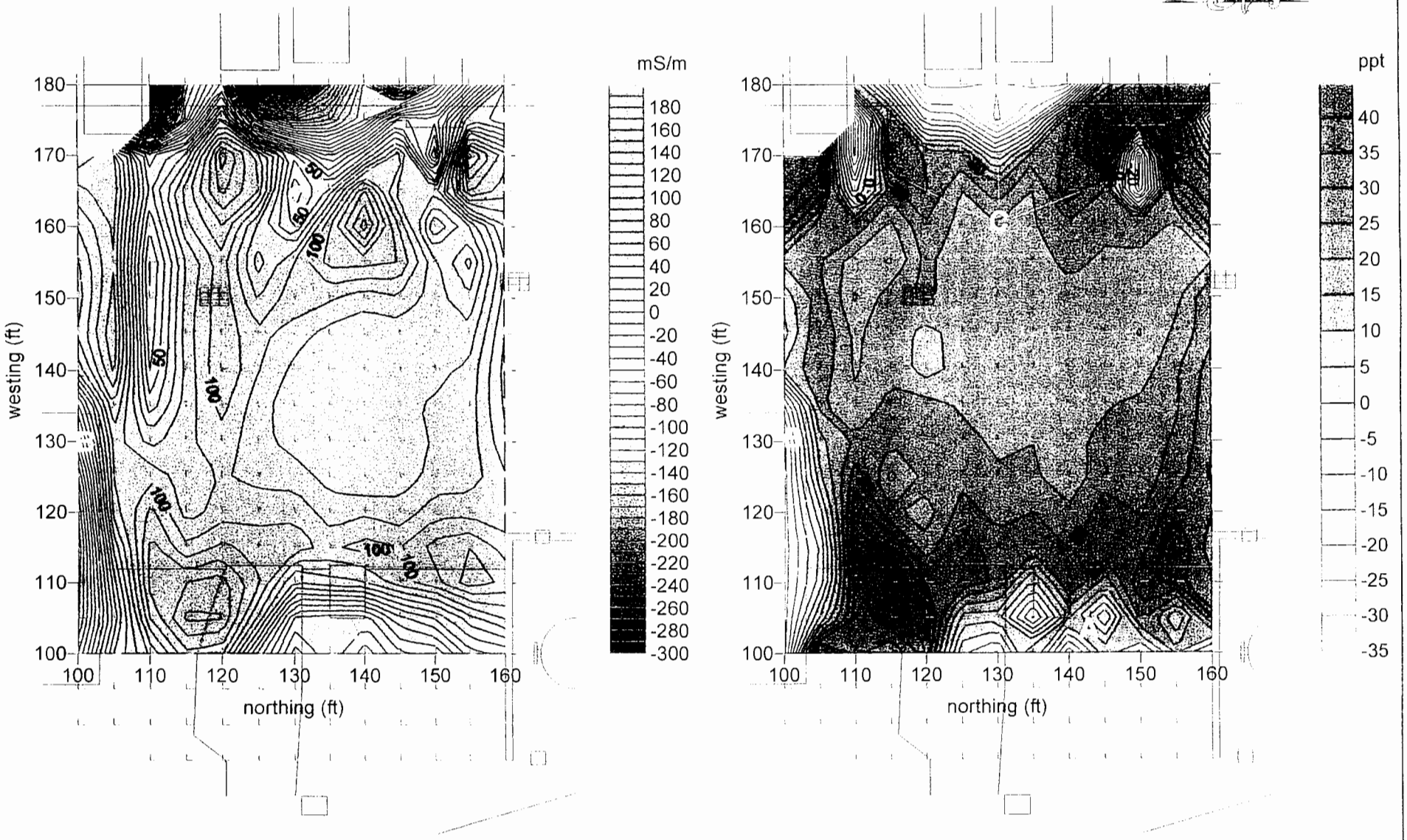
FIGURE 9

SCALE: 1" = 20'

MARCH 1, 2002



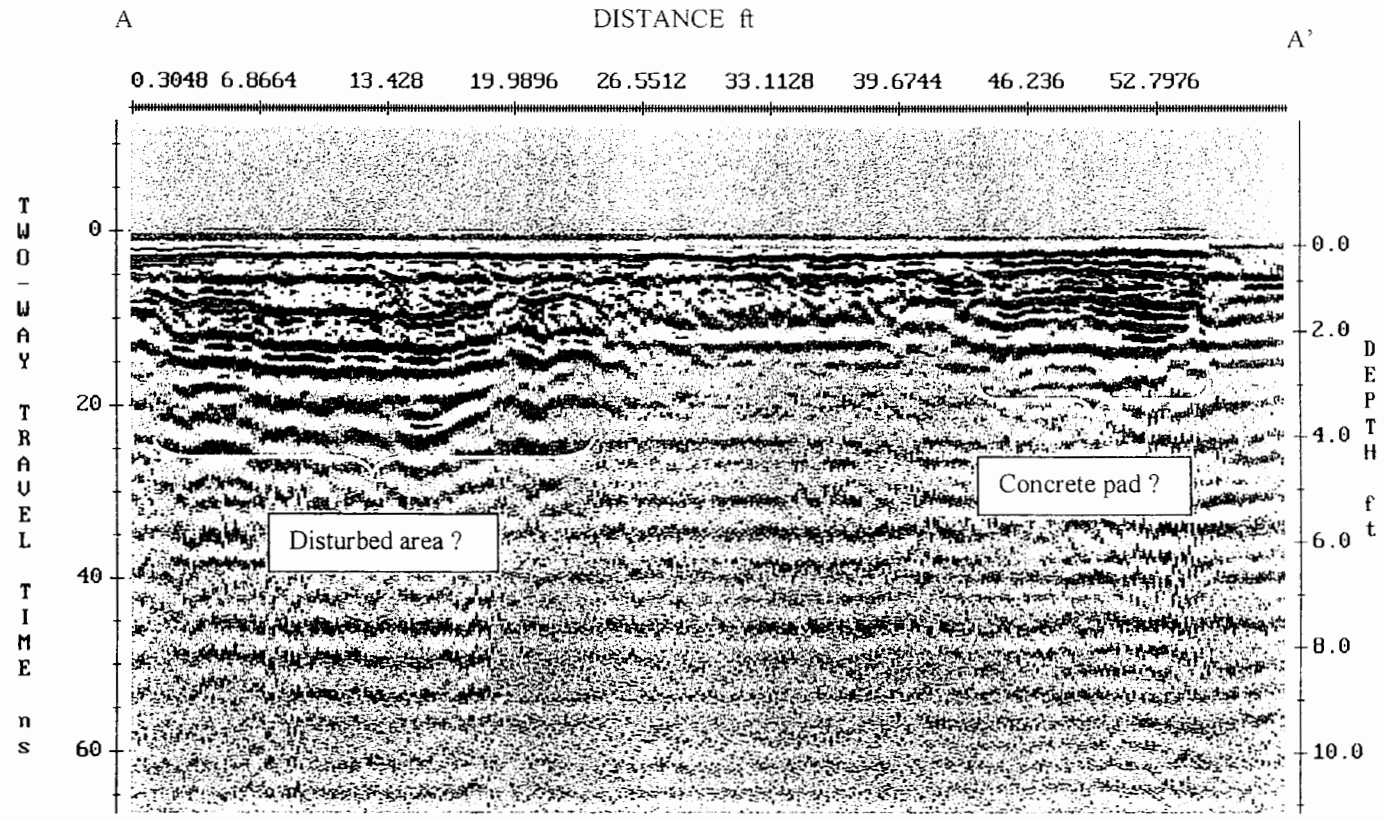
SWMU 20 GPR LINE BASE MAP HONEYWELL INTERNATIONAL CLAYMONT, DE PLANT	EARTH RESOURCES TECHNOLOGY	
FIGURE 10	SCALE 1" = 20'	MARCH 1, 2002



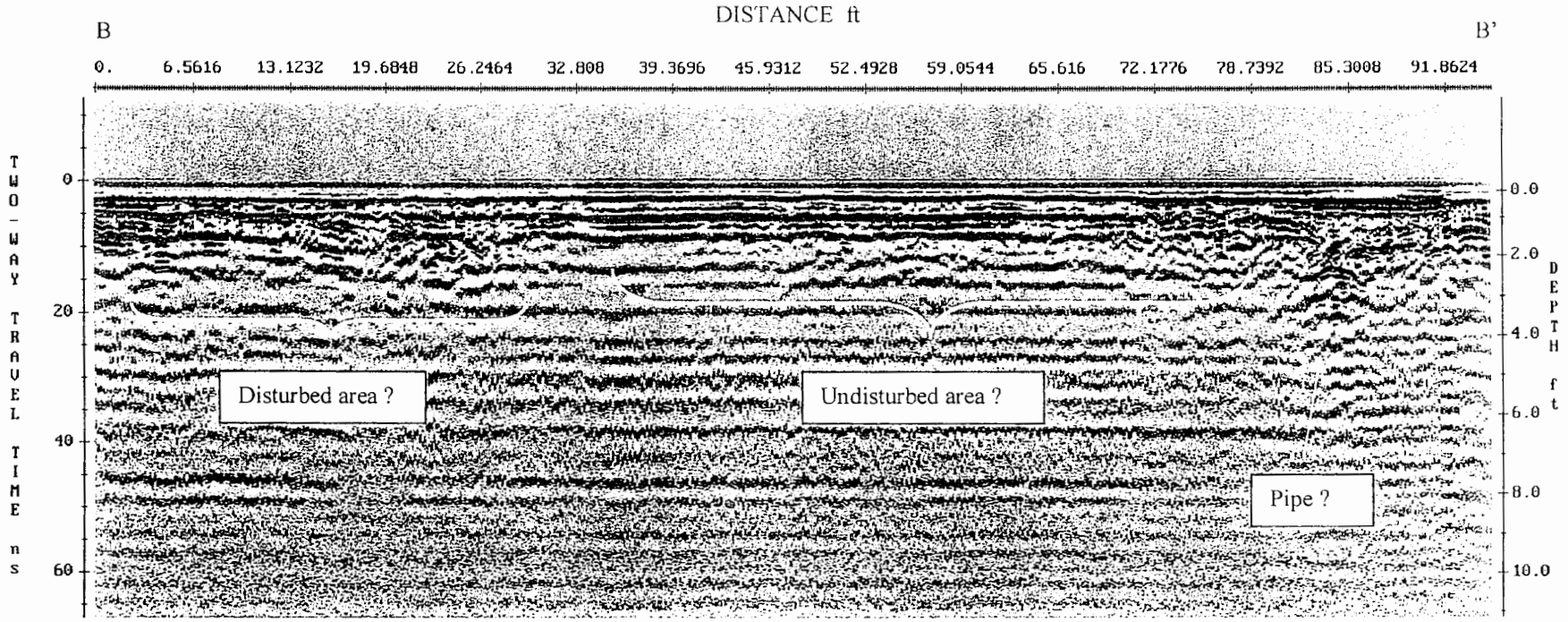
A: Quadrature (Conductivity)

B: In-phase

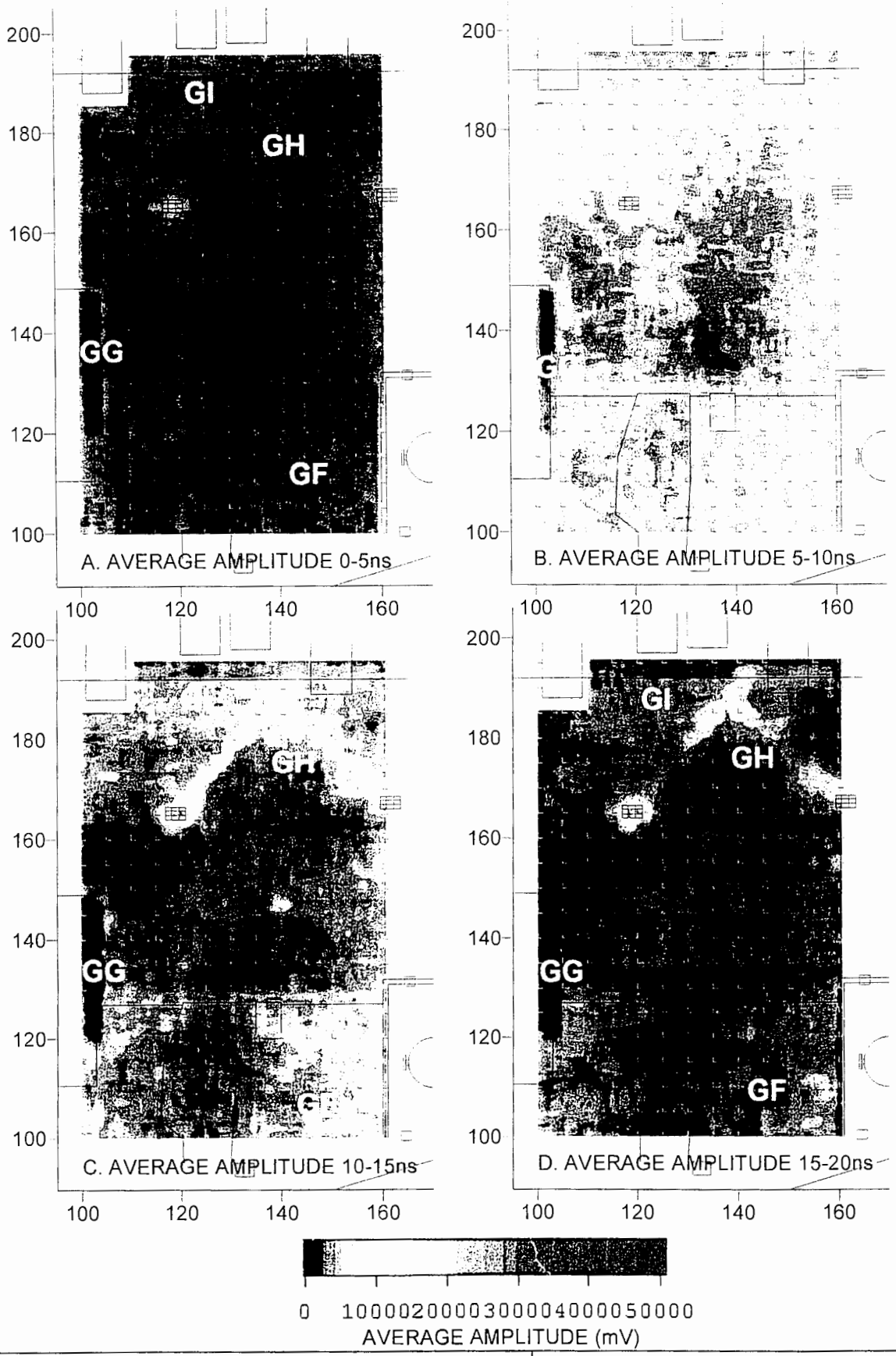
ERT EARTH RESOURCES TECHNOLOGY	SWMU 20 ELECTROMAGNETIC MAPS HONEYWELL INTERNATIONAL CLAYMONT, DE PLANT	FIGURE 11 SCALE: 1" = 20' MARCH 1, 2002



ERT EARTH RESOURCES TECHNOLOGY	GPR PROFILE A-A' SWMU 20 GPR SURVEY HONEYWELL INTERNATIONAL PLANT CLAYMONT, DE	FIGURE 12
SCALE AS SHOWN		MARCH 1, 2002



EARTH RESOURCES TECHNOLOGY	GPR PROFILE B-B' SWMU 20 GPR SURVEY HONEYWELL INTERNATIONAL PLANT CLAYMONT, DE	FIGURE 13
SCALE AS SHOWN		MARCH 1, 2002



GPR TIME SLICE MAPS SWMU 20 HONEYWELL INTERNATIONAL CLAYMONT, DE PLANT	EARTH RESOURCES TECHNOLOGY	
FIGURE 14	SCALE 1" = 30'	MARCH 1, 2002

APPENDIX C

TEST PIT LITHOLOGIC LOGS

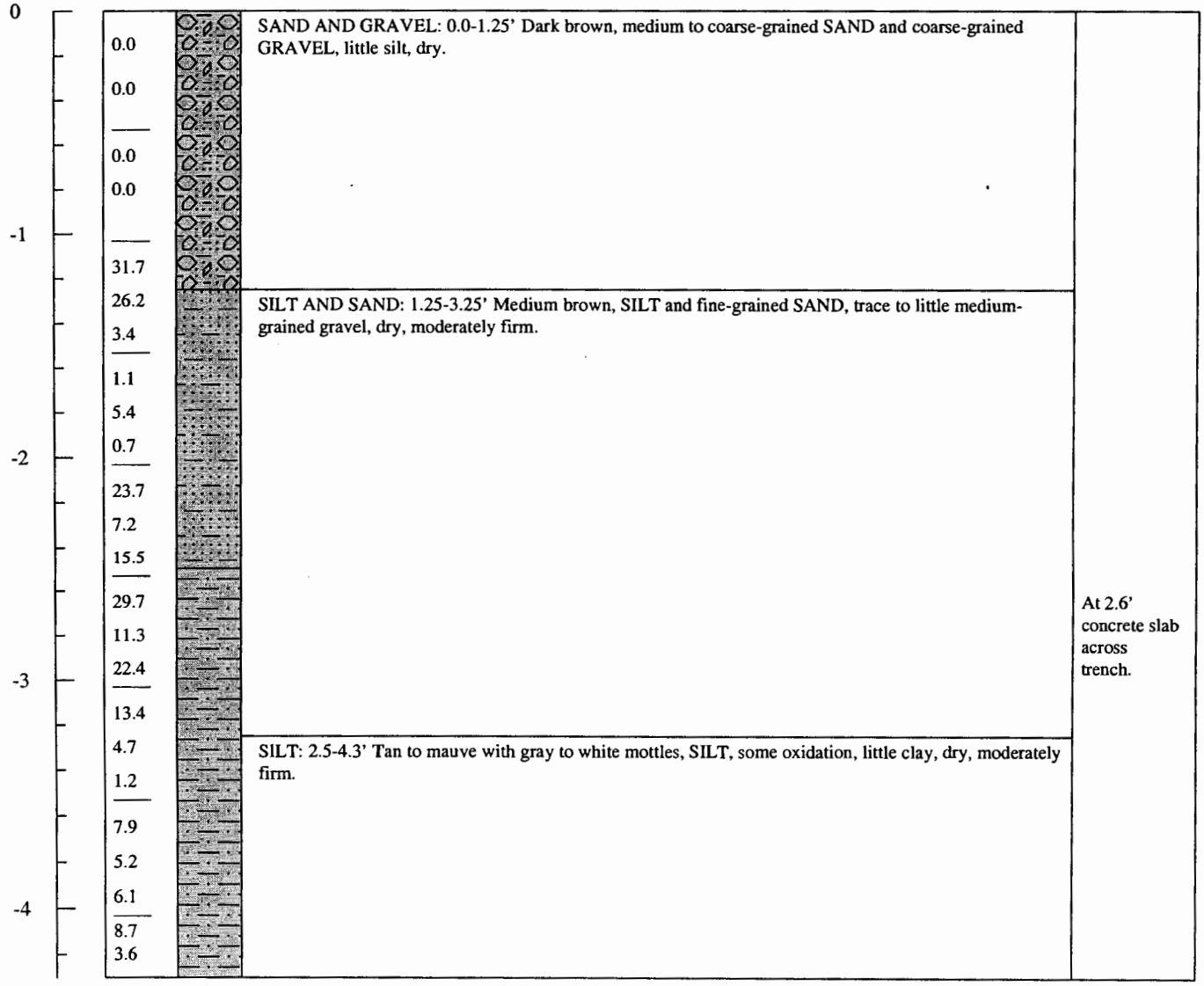
MWH
MONTGOMERY WATSON HARZA

MWH Americas, Inc.
335 Phoenixville Pike
Malvern, Pennsylvania 19355

Test Pit ID:SM13-TP01

Page 1 of 1

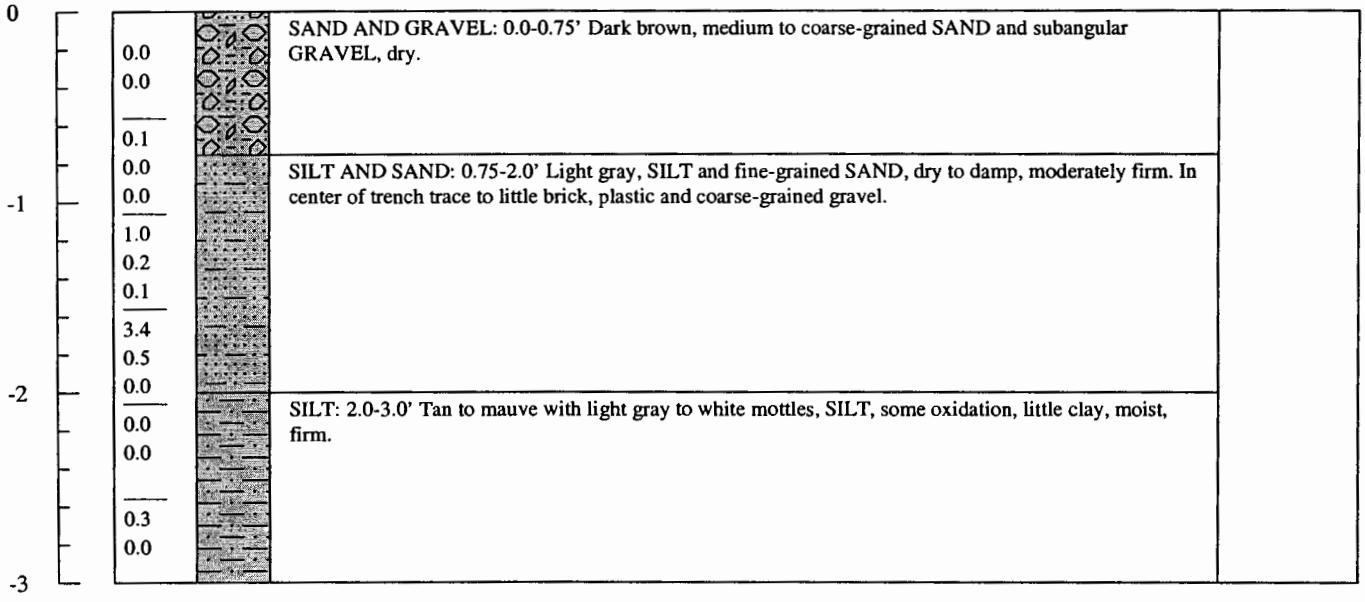
Project Name:	Honeywell-Claymont	**Sampling Method:**	Backhoe Bucket
Location:	Claymont, DE	**Test Pit Location:**	Southern perimeter of SWMU 13
Project Number:	2110876	**Total Depth (ft):**	4.3'
Date Started:	4/15/03	**Water Level During Drilling (ft/bgs):**	NA
Date Finished:	4/15/03	**Weather Conditions:**	Clear, 70's
Drilling Company:	Lewis Environmental	**Logged By:**	S. Bouclier, Geologist
Drilling Method:	Backhoe		



MWH
MONTGOMERY WATSON HARZA
MWH Americas, Inc.
335 Phoenixville Pike
Malvern, Pennsylvania 19355

Test Pit ID:SM13-TP02

Project Name:	Honeywell-Claymont	**Sampling Method:**	Backhoe Bucket
Location:	Claymont, DE	**Test Pit Location:**	Across Geophysics Boundary
Project Number:	2110876	**Total Depth (ft):**	3.0'
Date Started:	4/15/03	**Water Level During Drilling (ft/bgs):**	NA
Date Finished:	4/15/03	**Weather Conditions:**	Clear, 70's
Drilling Company:	Lewis Environmental	**Logged By:**	S. Bouclier, Geologist
Drilling Method:	Backhoe		



MWH
MONTGOMERY WATSON HARZA

MWH Americas, Inc.
335 Phoenixville Pike
Malvern, Pennsylvania 19355

Test Pit ID:SM13-TP03

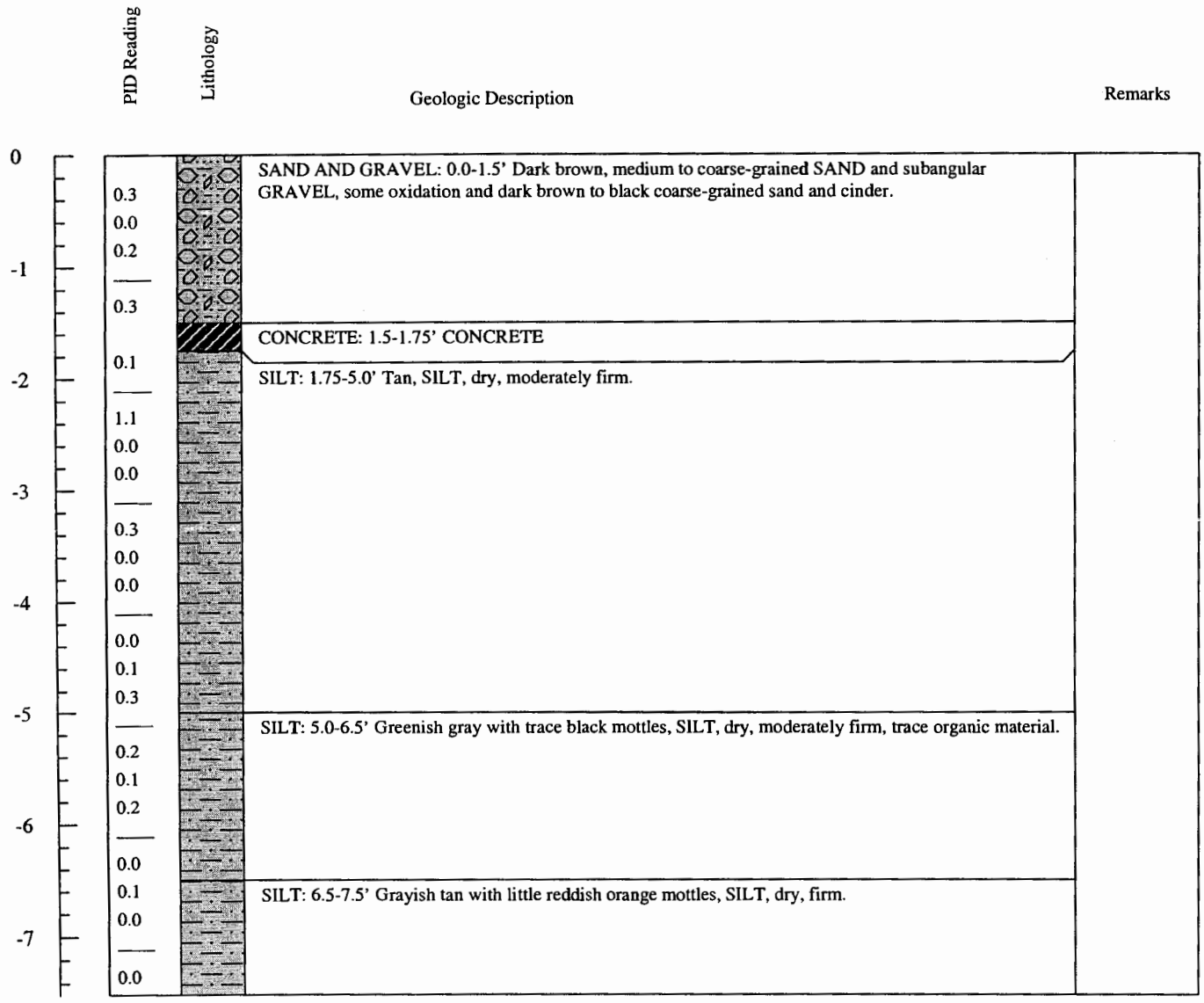
Project Name:	Honeywell-Claymont	**Sampling Method:**	Backhoe Bucket
Location:	Claymont, DE	**Test Pit Location:**	Across Geophysics Boundary
Project Number:	2110876	**Total Depth (ft):**	1.5'
Date Started:	4/15/03	**Water Level During Drilling (ft/bgs):**	NA
Date Finished:	4/15/03	**Weather Conditions:**	Clear, 80's
Drilling Company:	Lewis Environmental	**Logged By:**	S. Bouclier, Geologist
Drilling Method:	Backhoe		

	PID Reading	Lithology	Geologic Description	Remarks
0	0.1 0.0 0.4		SAND AND GRAVEL: 0.0-1.0' Dark brown, medium to coarse-grained SAND and subangular GRAVEL, dry.	Refusal at 1.5', thick concrete slab that extends entire length of trench.
-1	3.1 5.0 0.8			
	53.2 41.7 11.2		SAND AND GRAVEL: 1.0-1.5' Dark brown, medium to coarse-grained SAND and fine to medium-grained subangular GRAVEL, dry.	

MWH
MONTGOMERY WATSON HARZA
MWH Americas, Inc.
335 Phoenixville Pike
Malvern, Pennsylvania 19355

Test Pit ID:SM13-TP04

Project Name:	Honeywell-Claymont	**Sampling Method:**	Backhoe Bucket
Location:	Claymont, DE	**Test Pit Location:**	Across Geophysics Boundary
Project Number:	2110876	**Total Depth (ft):**	7.5'
Date Started:	4/15/03	**Water Level During Drilling (ft/bgs):**	NA
Date Finished:	4/15/03	**Weather Conditions:**	Clear, 70's
Drilling Company:	Lewis Environmental	**Logged By:**	S. Bouclier, Geologist
Drilling Method:	Backhoe		



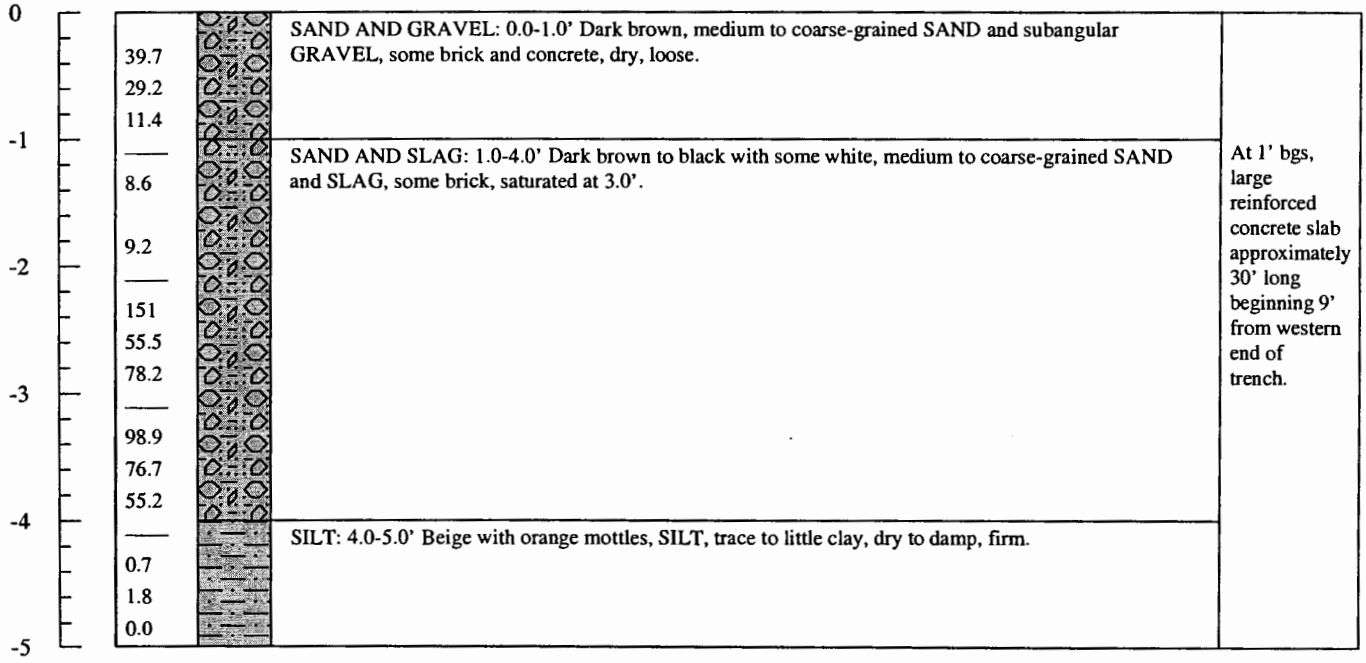
MWH
MONTGOMERY WATSON HARZA

MWH Americas, Inc.
335 Phoenixville Pike
Malvern, Pennsylvania 19355

Test Pit ID:SM13-TP05

Page 1 of 1

Project Name:	Honeywell-Claymont	**Sampling Method:**	Backhoe Bucket
Location:	Claymont, DE	**Test Pit Location:**	Estimated Location of Buried Drums
Project Number:	2110876	**Total Depth (ft):**	5.0'
Date Started:	4/29/03	**Water Level During Drilling (ft/bgs):**	NA
Date Finished:	4/29/03	**Weather Conditions:**	Clear, 70's
Drilling Company:	Lewis Environmental	**Logged By:**	S. Bouclier, Geologist
Drilling Method:	Backhoe		



MWH
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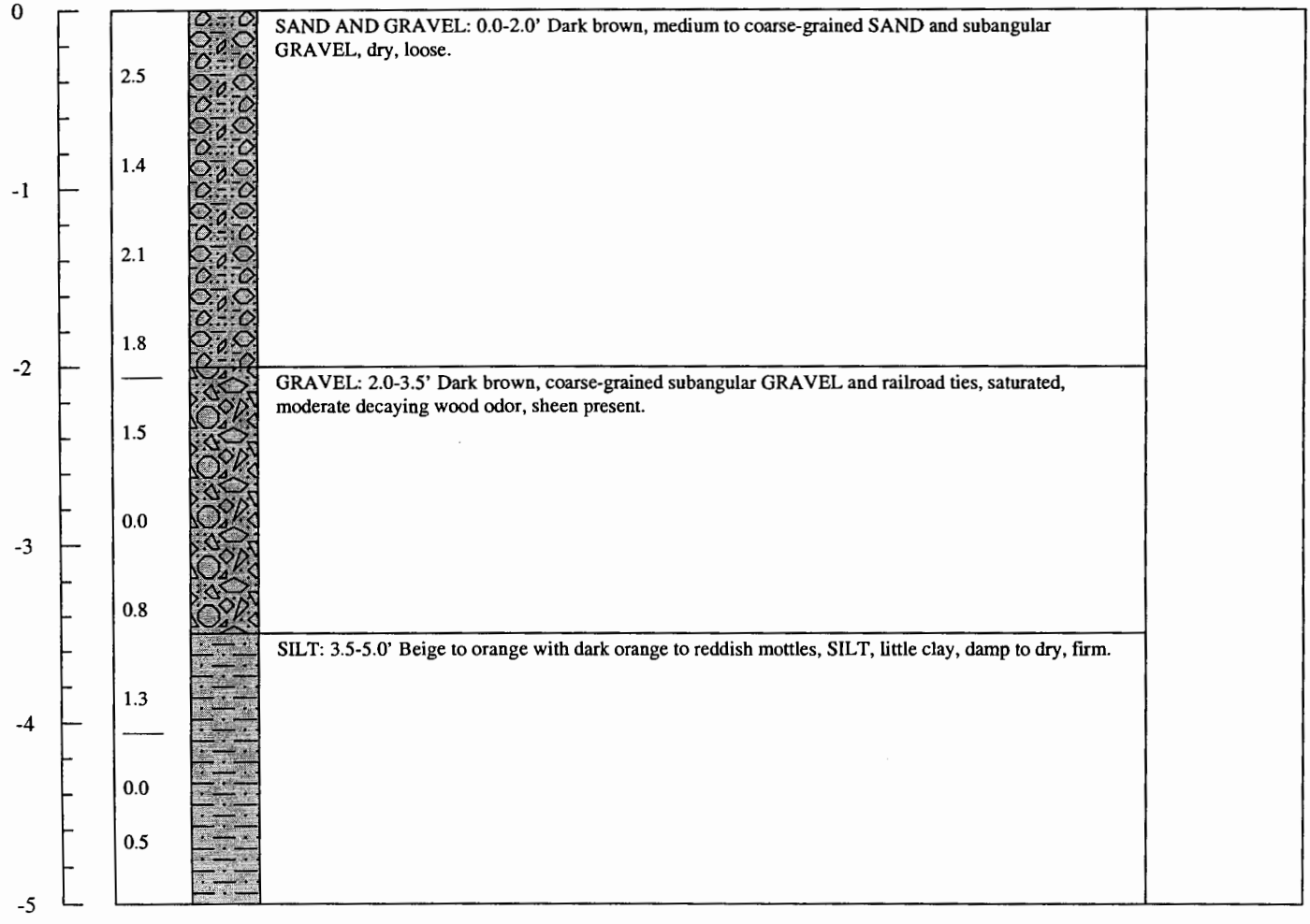
Test Pit ID:SM13-TP06

Project Name:	Honeywell-Claymont	**Sampling Method:**	Backhoe Bucket
Location:	Claymont, DE	**Test Pit Location:**	Northern Perimeter of SWMU
Project Number:	2110876	**Total Depth (ft):**	5.0'
Date Started:	4/29/03	**Water Level During Drilling (ft/bgs):**	NA
Date Finished:	4/29/03	**Weather Conditions:**	Clear, 70's
Drilling Company:	Lewis Environmental	**Logged By:**	S. Bouclier, Geologist
Drilling Method:	Backhoe		



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Test Pit ID:SM13-TP07

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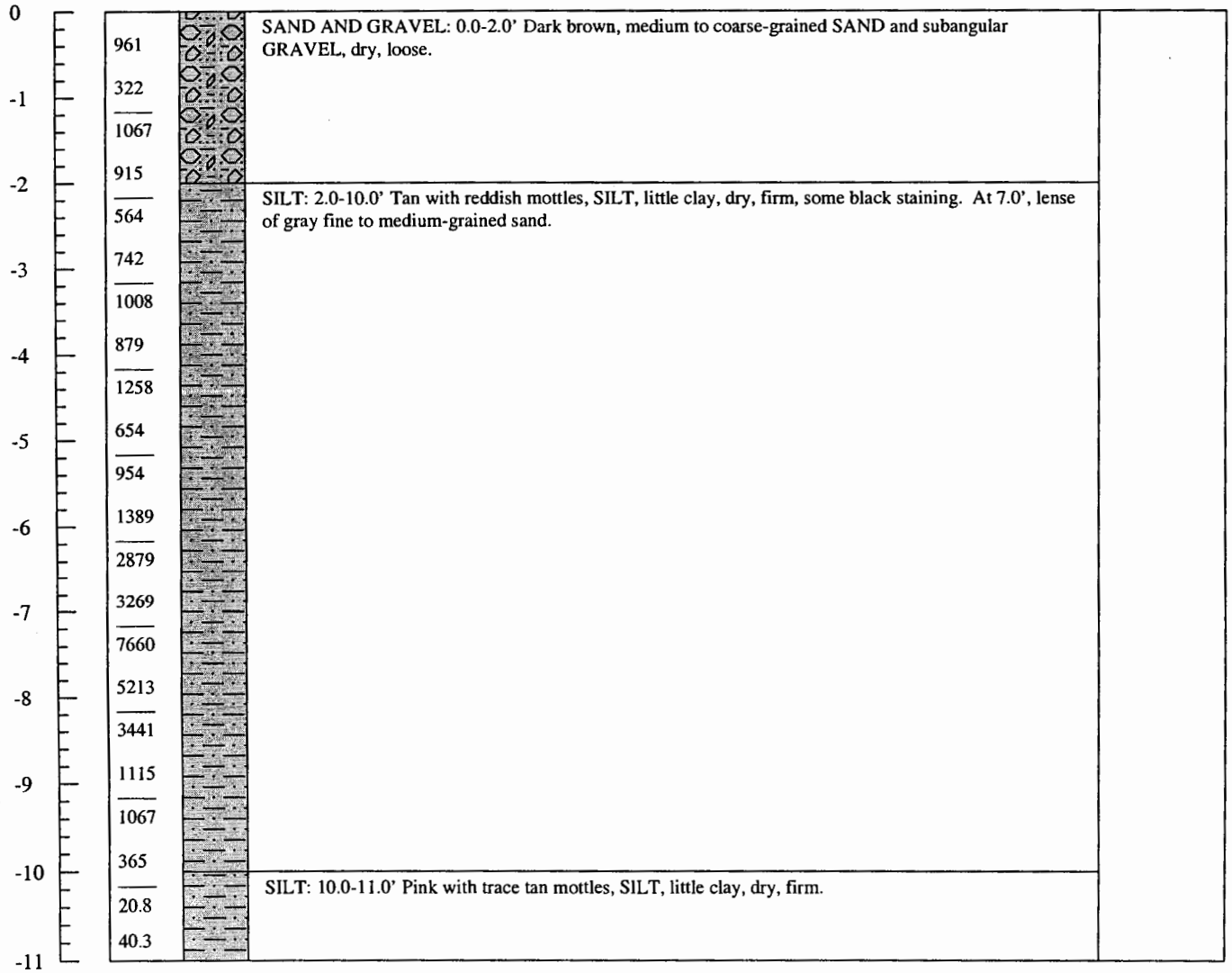
Project Name:	Honeywell-Claymont	**Sampling Method:**	Backhoe Bucket
Location:	Claymont, DE	**Test Pit Location:**	Across Geophysic Boundary
Project Number:	2110876	**Total Depth (ft):**	11.0'
Date Started:	4/16/03	**Water Level During Drilling (ft/bgs):**	NA
Date Finished:	4/16/03	**Weather Conditions:**	Clear, 70's
Drilling Company:	Lewis Environmental	**Logged By:**	S. Bouclier, Geologist
Drilling Method:	Backhoe		



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Test Pit ID:SM14-TP01

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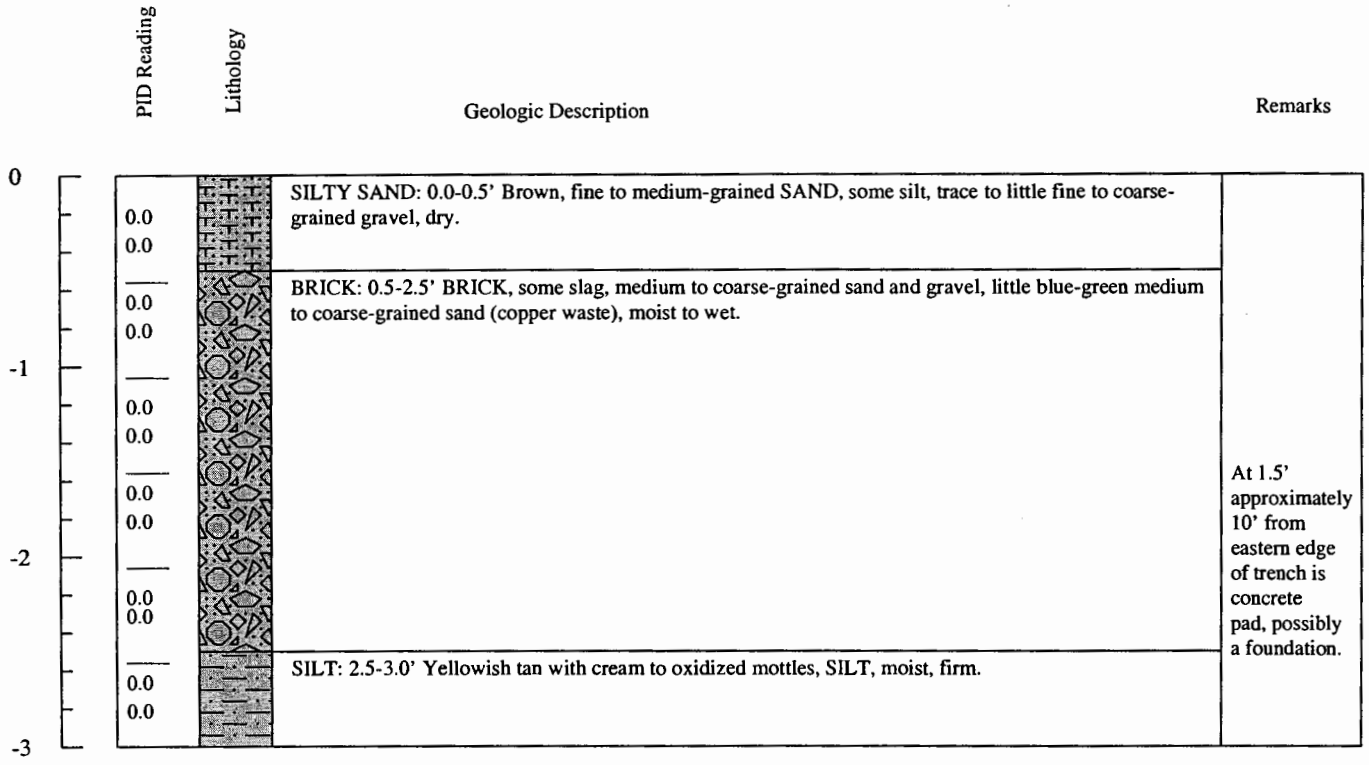
Project Name:	Honeywell-Claymont	**Sampling Method:**	Backhoe Bucket
Location:	Claymont, DE	**Test Pit Location:**	Western perimeter, into truck parking lot
Project Number:	2110876	**Total Depth (ft):**	3.0'
Date Started:	4/14/03	**Water Level During Drilling (ft/bgs):**	2.6'
Date Finished:	4/14/03	**Weather Conditions:**	Overcast, 40's
Drilling Company:	Lewis Environmental	**Logged By:**	S. Bouclier, Geologist
Drilling Method:	Backhoe		



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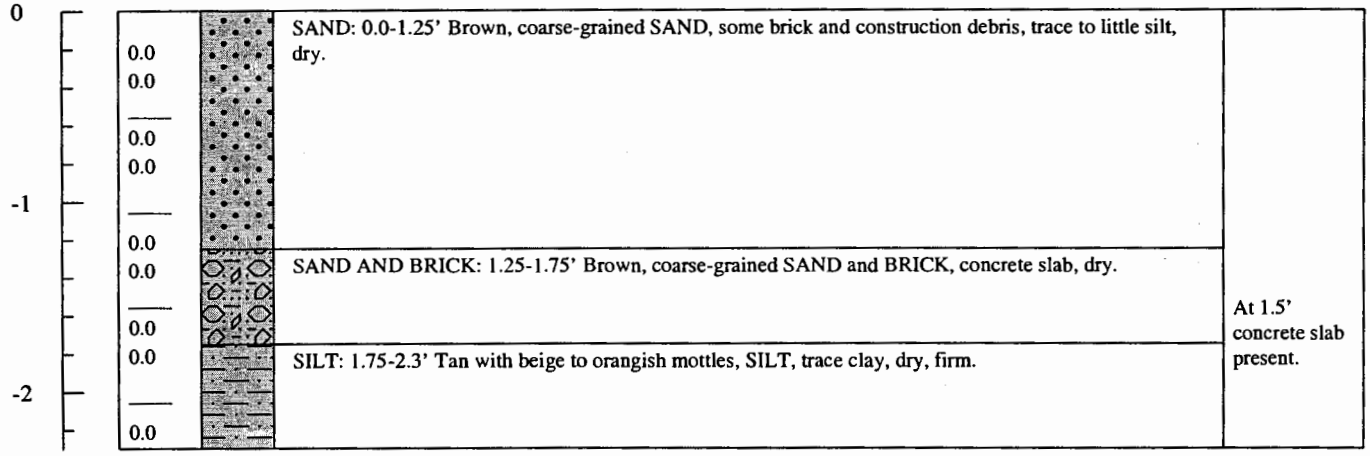
Test Pit ID:SM14-TP02

Project Name:	Honeywell-Claymont	**Sampling Method:**	Backhoe Bucket
Location:	Claymont, DE	**Test Pit Location:**	Southern perimeter, west of chiller
Project Number:	2110876	**Total Depth (ft):**	2.6'
Date Started:	4/14/03	**Water Level During Drilling (ft/bgs):**	NA
Date Finished:	4/14/03	**Weather Conditions:**	Overcast, 40's
Drilling Company:	Lewis Environmental	**Logged By:**	S. Bouclier, Geologist
Drilling Method:	Backhoe		



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Test Pit ID:SM14-TP03

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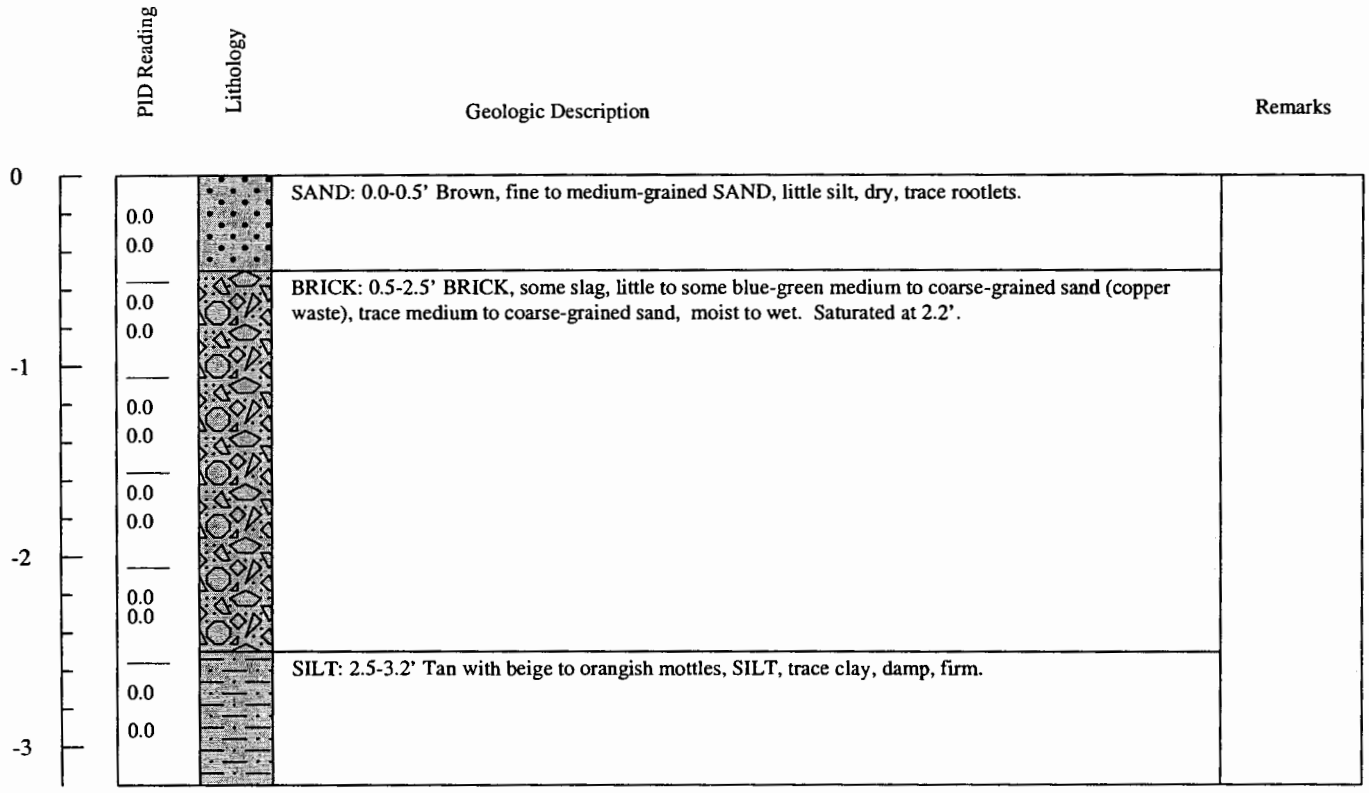
Project Name:	Honeywell-Claymont	**Sampling Method:**	Backhoe Bucket
Location:	Claymont, DE	**Test Pit Location:**	Southeast of AST
Project Number:	2110876	**Total Depth (ft):**	3.2'
Date Started:	4/14/03	**Water Level During Drilling (ft/bgs):**	
Date Finished:	4/14/03	**Weather Conditions:**	Overcast, 40's
Drilling Company:	Lewis Environmental	**Logged By:**	S. Bouclier, Geologist
Drilling Method:	Backhoe		



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Test Pit ID:SM14-TP04

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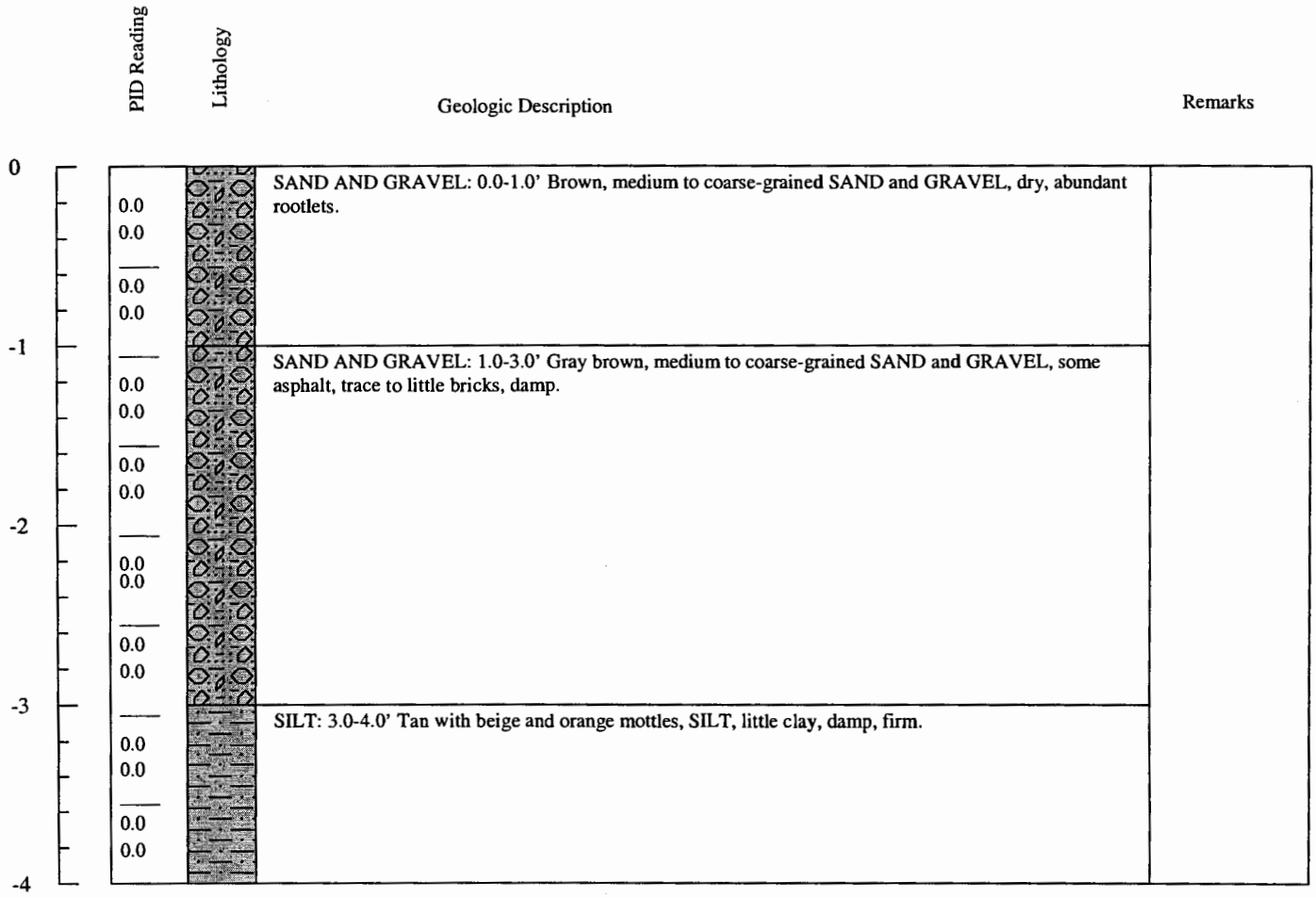
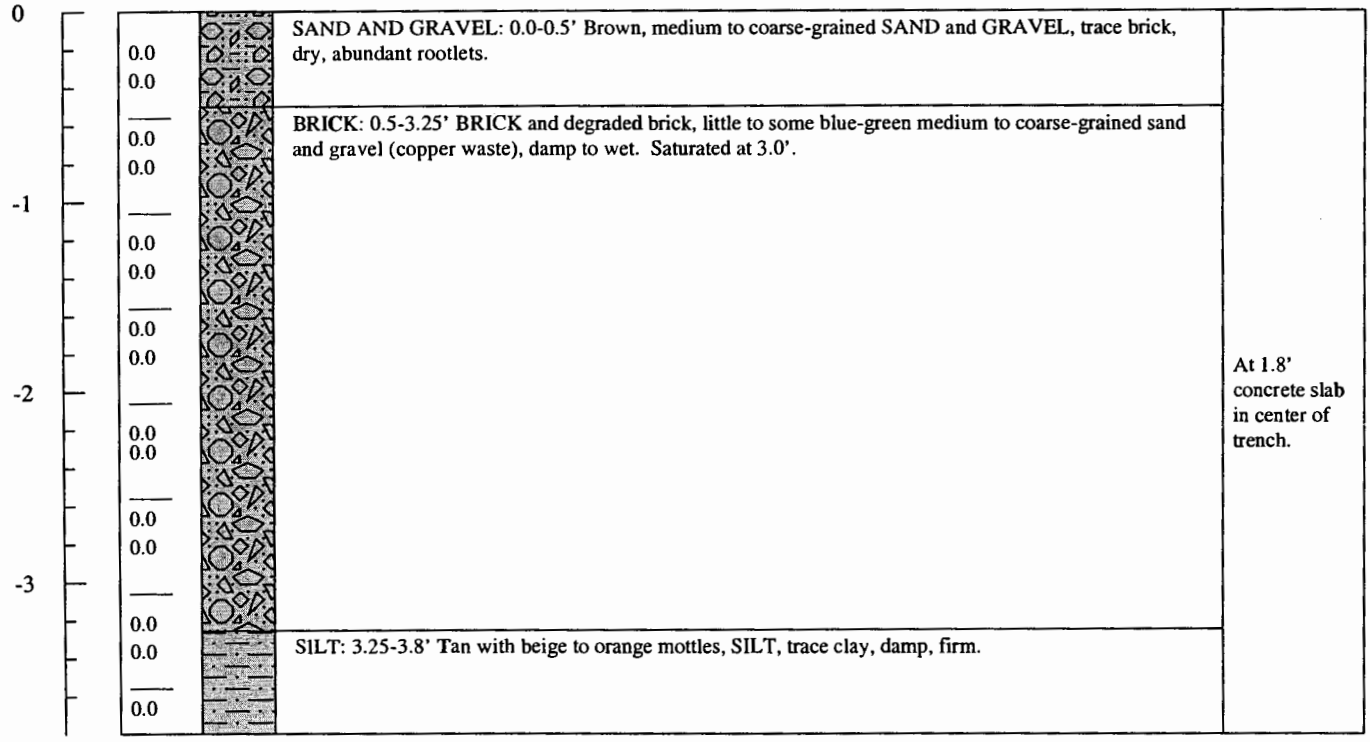
Project Name:	Honeywell-Claymont	**Sampling Method:**	Backhoe Bucket
Location:	Claymont, DE	**Test Pit Location:**	Eastern Perimeter along fence
Project Number:	2110876	**Total Depth (ft):**	4.0'
Date Started:	4/14/03	**Water Level During Drilling (ft/bgs):**	
Date Finished:	4/14/03	**Weather Conditions:**	Overcast, 40's
Drilling Company:	Lewis Environmental	**Logged By:**	S. Bouclier, Geologist
Drilling Method:	Backhoe		



MWH Americas, Inc. 335 Phoenixville Pike Malvern, Pennsylvania 19355	**Test Pit ID:SM14-TP05** Page 1 of 1

Project Name:	Honeywell-Claymont	**Sampling Method:**	Backhoe Bucket
Location:	Claymont, DE	**Test Pit Location:**	Northeast from AST on diagonal
Project Number:	2110876	**Total Depth (ft):**	3.8'
Date Started:	4/14/03	**Water Level During Drilling (ft/bgs):**	2.6'
Date Finished:	4/14/03	**Weather Conditions:**	Overcast, 40's
Drilling Company:	Lewis Environmental	**Logged By:**	S. Bouclier, Geologist
Drilling Method:	Backhoe		



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Test Pit ID:SM14-TP06

Project Name:	Honeywell-Claymont	**Sampling Method:**	Backhoe Bucket
Location:	Claymont, DE	**Test Pit Location:**	Northern perimeter
Project Number:	2110876	**Total Depth (ft):**	3.8'
Date Started:	4/14/03	**Water Level During Drilling (ft/bgs):**	
Date Finished:	4/14/03	**Weather Conditions:**	Overcast, 40's
Drilling Company:	Lewis Environmental	**Logged By:**	S. Bouclier, Geologist
Drilling Method:	Backhoe		

	PID Reading	Lithology	Geologic Description	Remarks
0	0.0 0.0		SAND: 0.0-0.5' Brown, medium to coarse-grained SAND, some medium to coarse-grained gravel, little silt, trace bricks and blue-green medium to coarse-grained sand (copper waste), moist.	
	0.0 0.0		BRICK: 0.5-1.5' BRICK and degraded brick, little to some blue-green medium to coarse-grained sand and gravel (copper waste), damp to wet. Saturated at 1.25'.	At 1.0' bgs, concrete slab running across trench.
-1	0.0 0.0			
	0.0 0.0		SILT: 1.5-2.0' Tan with beige to orange mottles, SILT, trace clay, damp, firm.	
-2				

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Test Pit ID:SM15-TP01

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Project Name:	Honeywell-Claymont	**Sampling Method:**	Backhoe Bucket
Location:	Claymont, DE	**Test Pit Location:**	North of Former Storage Area
Project Number:	2110876	**Total Depth (ft):**	3.5'
Date Started:	4/8/03	**Water Level During Drilling (ft/bgs):**	3.5'
Date Finished:	4/8/03	**Weather Conditions:**	Overcast, 50's
Drilling Company:	Lewis Environmental	**Logged By:**	S. Bouclier, Geologist
Drilling Method:	Backhoe		

PID Reading	Lithology	Geologic Description	Remarks
0.7 0.0 0.0 0.0		SILT AND SAND: 0.0-2.0' Dark brown SILT and fine-grained SAND, moist, moderately firm.	
11.8 5.7 0.0 0.0			
58.2 47.3 65.1		SILT: 2.0-2.5' Black with trace oxidation, SILT, damp, moderately firm. At ~2.25' color changes to olive to dark brown with lenses of black and oxidation.	
2.3 5.7 8.7		DEBRIS: 2.5-3.0' CONSTRUCTION DEBRIS (bricks, wood, glass), little silt, moist.	
3.9 2.4		SILT: 3.0-3.5' Greenish gray and brown with some oxidation, SILT, little clay, trace to little fine-grained sand, trace lenses of black silt, wet. At 3.5' saturated.	

0
-1
-2
-3

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Test Pit ID:SM15-TP02

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Project Name:	Honeywell-Claymont	**Sampling Method:**	Backhoe Bucket
Location:	Claymont, DE	**Test Pit Location:**	East of Former Storage Area
Project Number:	2110876	**Total Depth (ft):**	5.0'
Date Started:	4/8/03	**Water Level During Drilling (ft/bgs):**	2.0'
Date Finished:	4/8/03	**Weather Conditions:**	Overcast, 50's
Drilling Company:	Lewis Environmental	**Logged By:**	S. Bouclier, Geologist
Drilling Method:	Backhoe		

	PID Reading	Lithology	Geologic Description	Remarks
0	0.0 0.0		SAND: 0.0-0.5' Dark brown, medium-grained SAND, some silt, moist, abundant rootlets.	
	0.0 0.0		SAND: 0.5-1.0' Dark brown, medium-grained SAND, layers of oxidation, moist.	
-1	0.0 0.0		SAND: 1.0-1.5' Dark brown, medium-grained SAND, some black silt and little clay, moist.	
	0.0 0.0		SILT: 1.5-2.0' Black, SILT, some oxidized medium-grained sand, little clay, moist, moderately firm.	
-2	0.0 0.0		SILT: 2.0-3.0' Black, SILT and CONSTRUCTION DEBRIS (bricks, coarse-grained subangular gravel, wood, trace glass), some oxidized medium-grained sand , little clay, saturated.	
	0.0 0.0			
-3	0.0 0.0		SILT: 3.0-5.0' Tan with red to bluish gray mottles, SILT, trace to little clay, damp, firm.	At approximately 3.0', there is a large concrete slab extending 10' from the western edge of the trench to the eastern end of the trench, ~30'.
	0.0 0.0			
-4	0.0 0.0			
	0.0 0.0			
-5				

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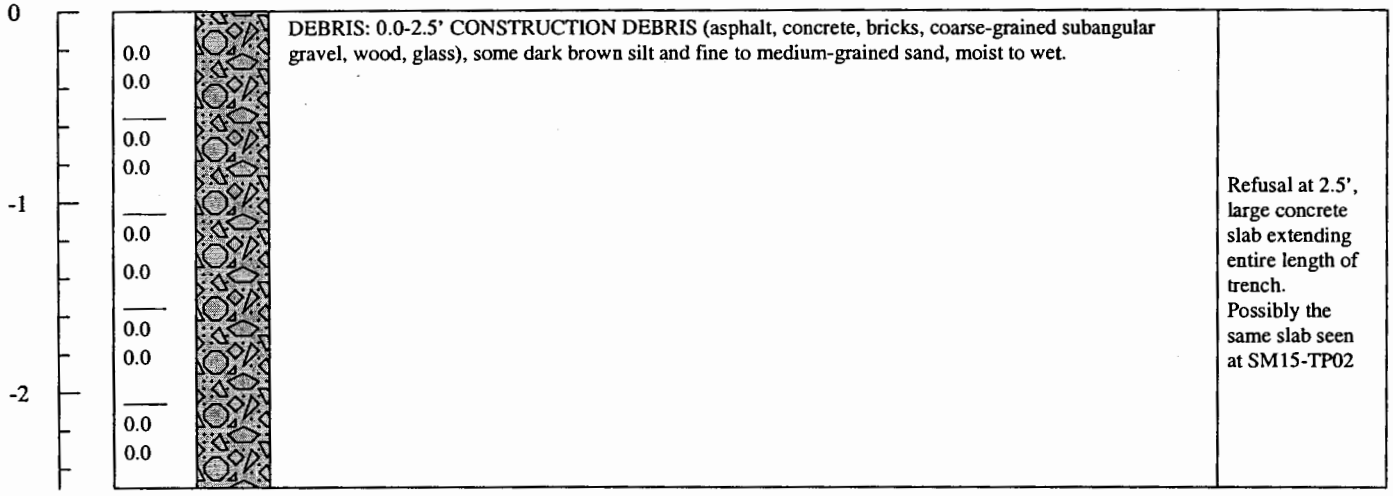
Test Pit ID:SM15-TP03

Project Name:	Honeywell-Claymont	**Sampling Method:**	Backhoe Bucket
Location:	Claymont, DE	**Test Pit Location:**	Southern side of SWMU, along gravel road
Project Number:	2110876	**Total Depth (ft):**	2.5'
Date Started:	4/8/03	**Water Level During Drilling (ft/bgs):**	2.5'
Date Finished:	4/8/03	**Weather Conditions:**	Overcast, 50's
Drilling Company:	Lewis Environmental	**Logged By:**	S. Bouclier, Geologist
Drilling Method:	Backhoe		



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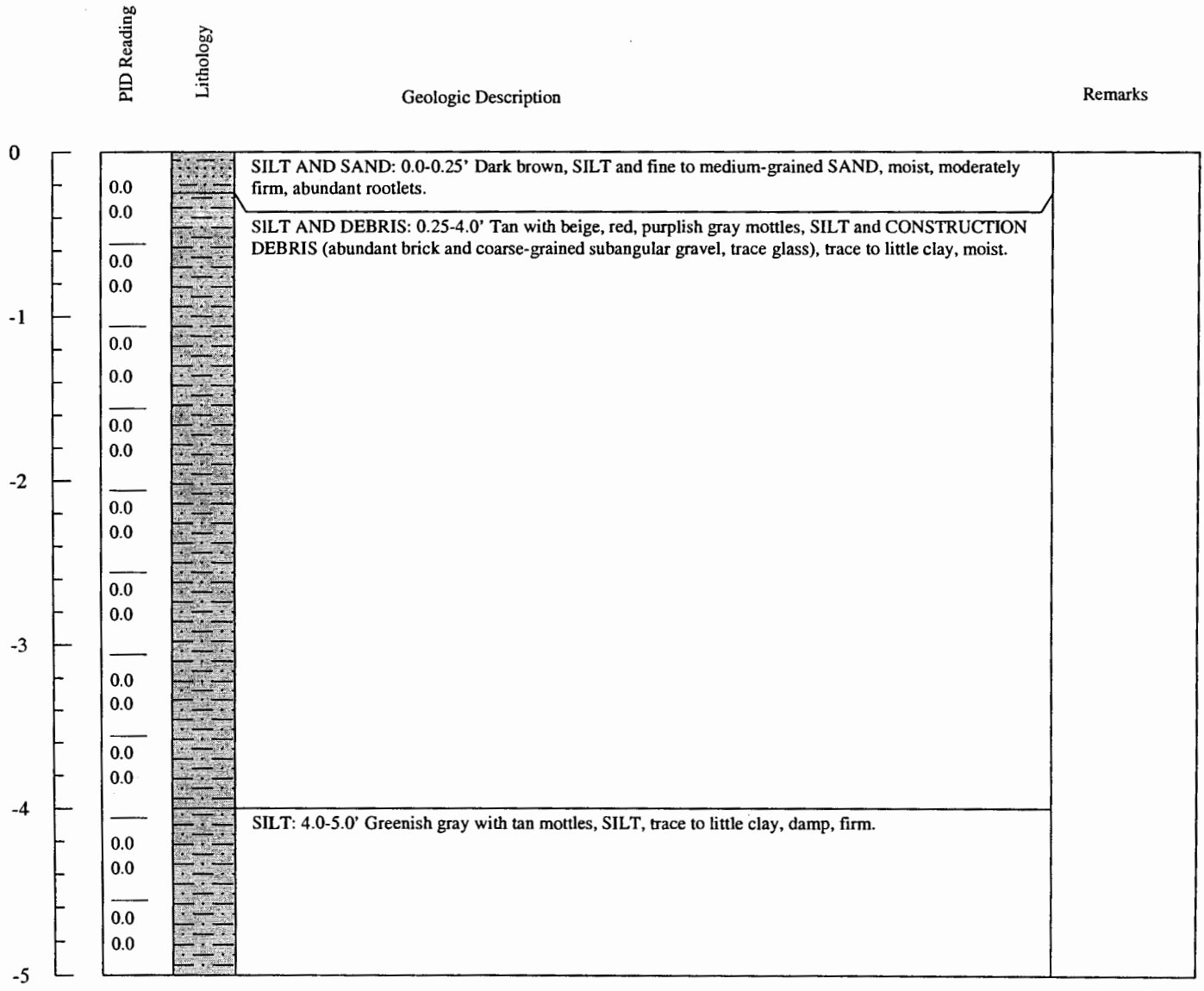
Test Pit ID:SM15-TP04

Project Name:	Honeywell-Claymont	**Sampling Method:**	Backhoe Bucket
Location:	Claymont, DE	**Test Pit Location:**	Eastern Side, along gravel road
Project Number:	2110876	**Total Depth (ft):**	5.0'
Date Started:	4/9/03	**Water Level During Drilling (ft/bgs):**	
Date Finished:	4/9/03	**Weather Conditions:**	Overcast, 50's
Drilling Company:	Lewis Environmental	**Logged By:**	S. Bouclier, Geologist
Drilling Method:	Backhoe		



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Test Pit ID:SM15-TP05

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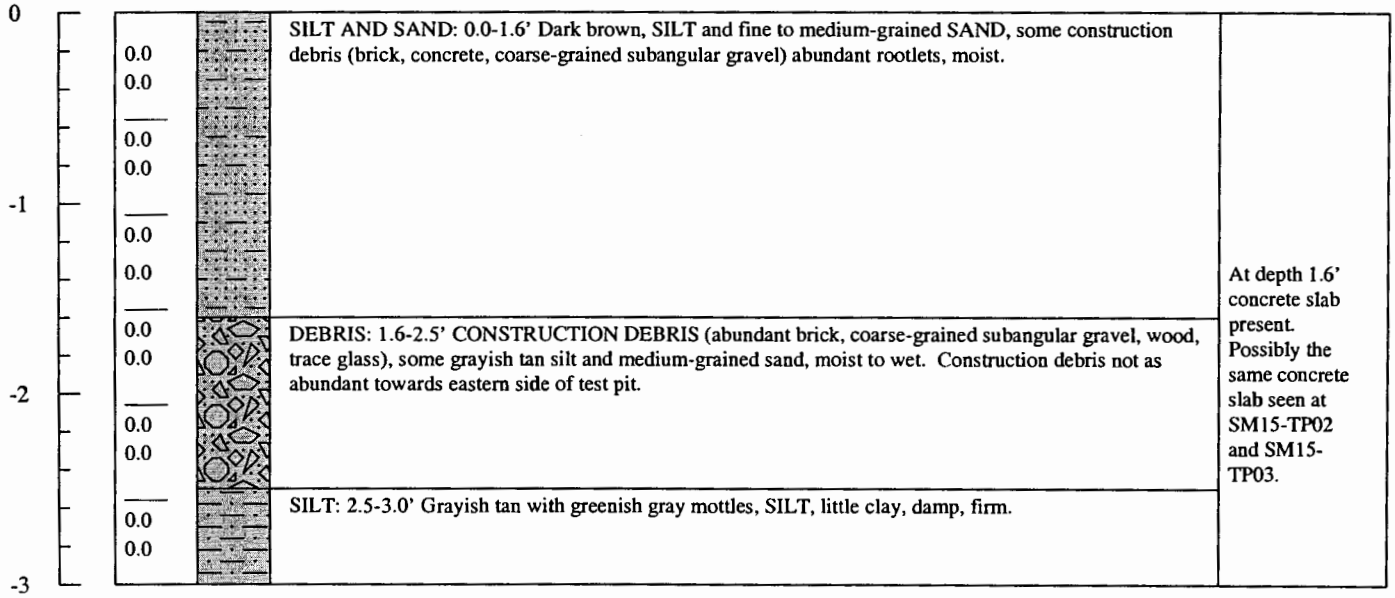
Project Name:	Honeywell-Claymont	**Sampling Method:**	Backhoe Bucket
Location:	Claymont, DE	**Test Pit Location:**	Eastern Side, along gravel road
Project Number:	2110876	**Total Depth (ft):**	3.0'
Date Started:	4/9/03	**Water Level During Drilling (ft/bgs):**	
Date Finished:	4/9/03	**Weather Conditions:**	Rain, 50's
Drilling Company:	Lewis Environmental	**Logged By:**	S. Bouclier, Geologist
Drilling Method:	Backhoe		



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Test Pit ID:SM15-TP06

Page 1 of 1

Project Name:	Honeywell-Claymont	**Sampling Method:**	Backhoe Bucket
Location:	Claymont, DE	**Test Pit Location:**	Northeast Corner
Project Number:	2110876	**Total Depth (ft):**	3.5'
Date Started:	4/9/03	**Water Level During Drilling (ft/bgs):**	
Date Finished:	4/9/03	**Weather Conditions:**	Rain, 40's
Drilling Company:	Lewis Environmental	**Logged By:**	S. Bouclier, Geologist
Drilling Method:	Backhoe		

PID Reading	Lithology	Geologic Description	Remarks
0.0 0.0		SILT: 0.0-0.5' Orangish tan with gray mottles, SILT, little clay, trace fine-grained sand, moist, moderately firm, abundant rootlets.	
0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0		DEBRIS: 0.5-3.0' CONSTRUCTION DEBRIS (brick, coarse-grained gravel, glass), some brown, silt and medium-grained sand, moist.	
0.0 0.0		SILT: 3.0-3.5' Grayish tan, mottled, SILT, little clay, damp, firm.	

0
-1
-2
-3

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Test Pit ID:SM15-TP07

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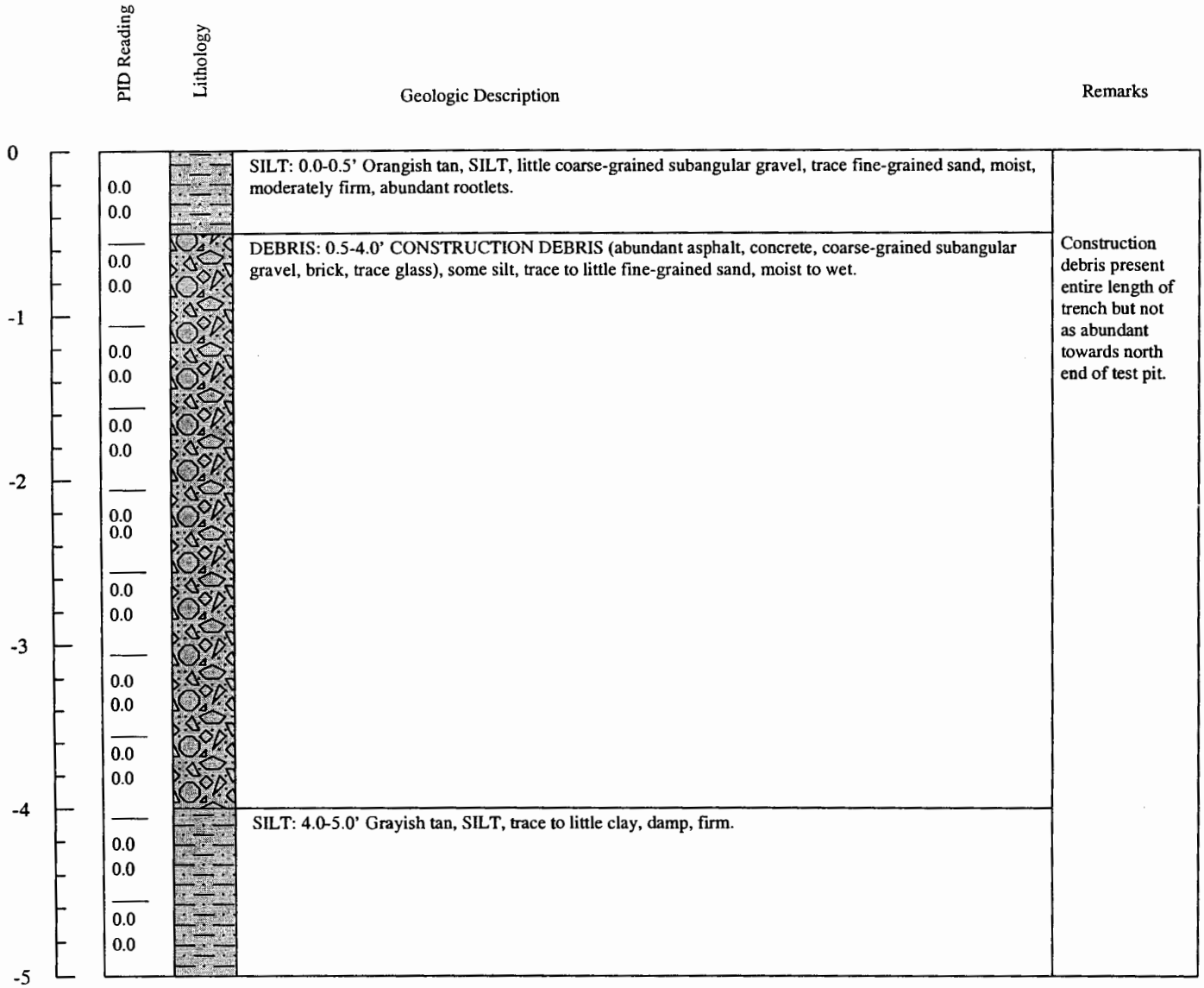
Project Name:	Honeywell-Claymont	**Sampling Method:**	Backhoe Bucket
Location:	Claymont, DE	**Test Pit Location:**	North Side, near utility poles
Project Number:	2110876	**Total Depth (ft):**	5.0'
Date Started:	4/10/03	**Water Level During Drilling (ft/bgs):**	4.0'
Date Finished:	4/10/03	**Weather Conditions:**	Overcast, 40's
Drilling Company:	Lewis Environmental	**Logged By:**	S. Bouclier, Geologist
Drilling Method:	Backhoe		



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Test Pit ID:SM15-TP08

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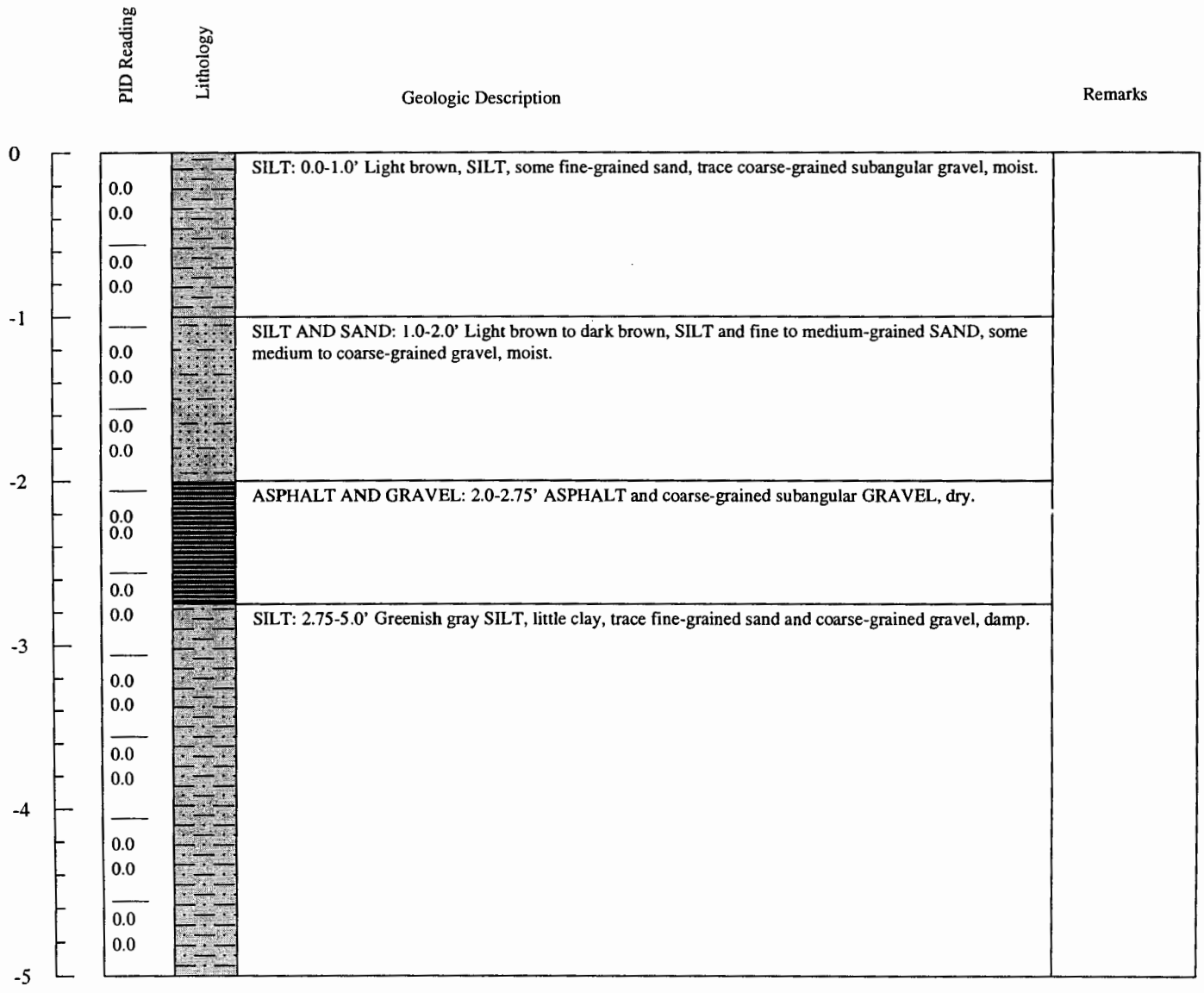
Project Name:	Honeywell-Claymont	**Sampling Method:**	Backhoe Bucket
Location:	Claymont, DE	**Test Pit Location:**	West side near large debris piles
Project Number:	2110876	**Total Depth (ft):**	5.0'
Date Started:	4/10/03	**Water Level During Drilling (ft/bgs):**	
Date Finished:	4/10/03	**Weather Conditions:**	Overcast, 40's
Drilling Company:	Lewis Environmental	**Logged By:**	S. Bouclier, Geologist
Drilling Method:	Backhoe		



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Boring ID: SM17-GP01

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Project Name:	Honeywell-Claymont SWMU 17	**Sampling Method:**	Geoprobe Macrocore
Location:	Claymont, DE	**Boring Location:**	In Front of Tank Entrance
Project Number:	2110876	**Total Depth (ft):**	7.0'
Date Started:	4/30/03	**Boring Diameter (in):**	2"
Date Finished:	4/30/03	**Water Level During Drilling (ft/bgs):**	NA
Drilling Company:	TerraProbe	**Weather Conditions:**	Clear, 70's
Drilling Method:	Geoprobe	**Logged By:**	S. Bouclier, Geologist

Blow Counts	Recovery (inches)	PID Reading	Lithology	Geologic Description	Remarks
		167		ASPHALT: 0.0-0.5' Asphalt, some medium to coarse-grained gravel, dry.	
		2000+		SAND AND GRAVEL: 0.5-2.0' Dark brown, medium to coarse-grained SAND and GRAVEL, some organics, trace glass, strong solvent odor.	
	48"	1805		SILT: 2.0-7.0' Grayish brown with orange mottles, SILT, little to some clay, saturated, black staining present.	
		147			
		792			
		267			
	40"	34.5			Refusal at 7.0'
		81.5			

0, -1, -2, -3, -4, -5, -6, -7

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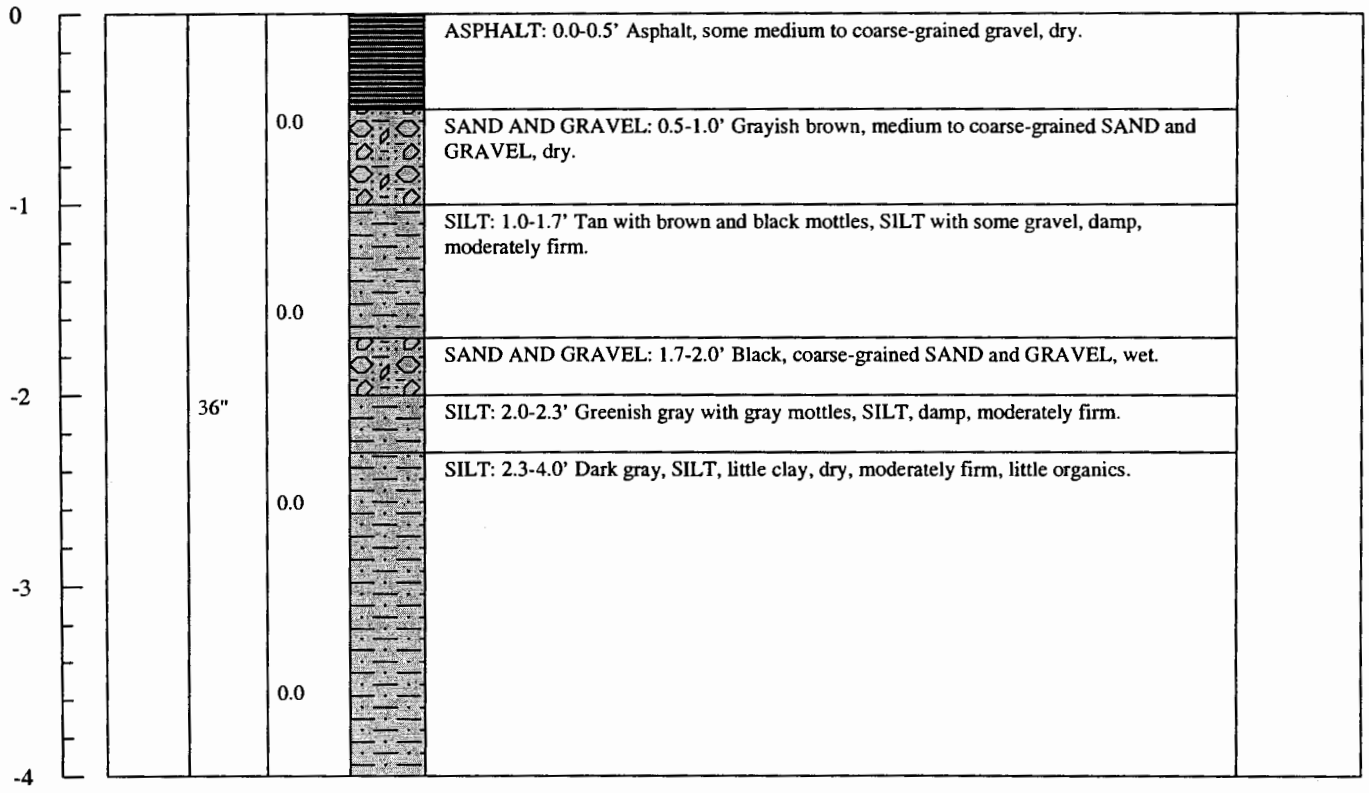
Boring ID: SM17-GP02

Page 1 of 1

Project Name:	Honeywell-Claymont SWMU 17	**Sampling Method:**	Geoprobe Macrocore
Location:	Claymont, DE	**Boring Location:**	17' North of Tank
Project Number:	2110876	**Total Depth (ft):**	4.0'
Date Started:	4/30/03	**Boring Diameter (in):**	2"
Date Finished:	4/30/03	**Water Level During Drilling (ft/bgs):**	NA
Drilling Company:	TerraProbe	**Weather Conditions:**	Clear, 70's
Drilling Method:	Geoprobe	**Logged By:**	S. Bouclier, Geologist



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Boring ID: SM17-GP03

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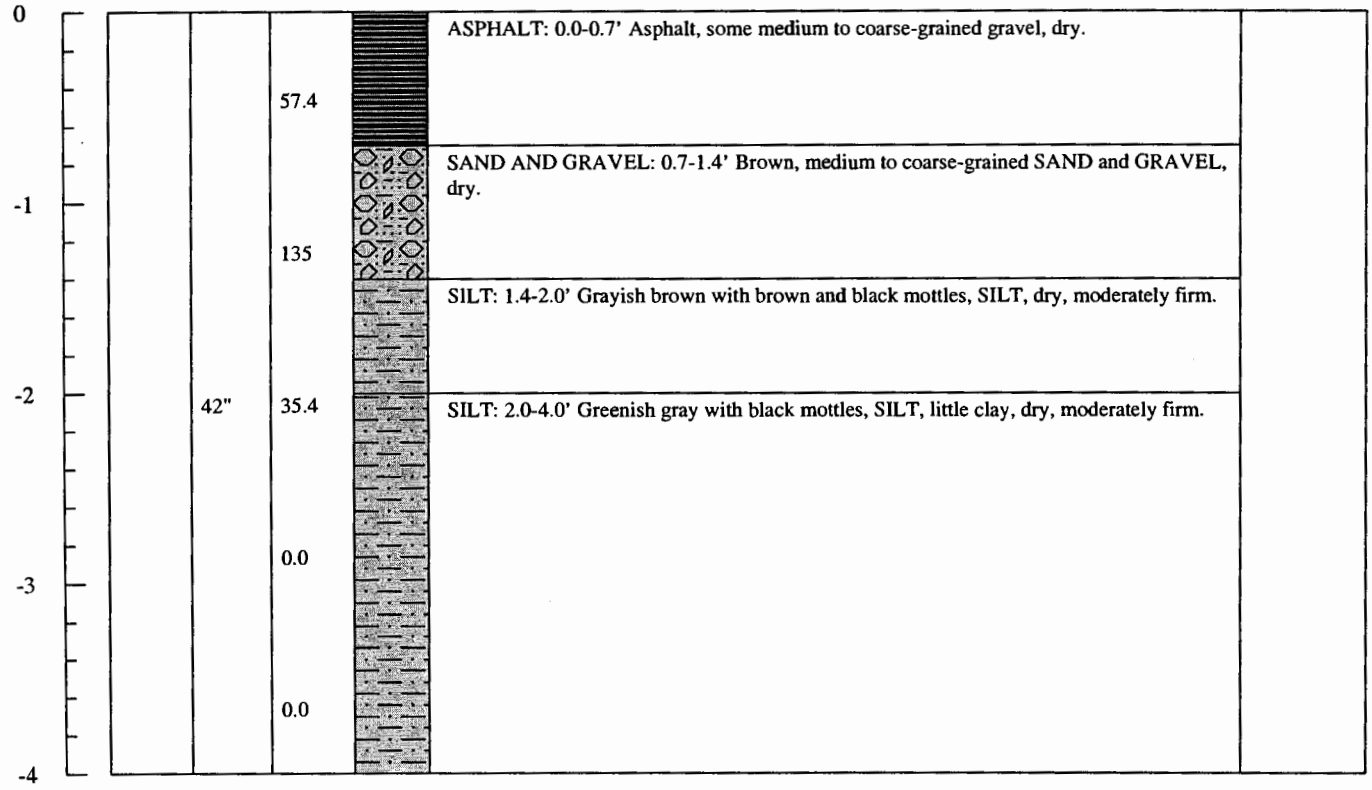
Project Name:	Honeywell-Claymont SWMU 17	**Sampling Method:**	Geoprobe Macrocore
Location:	Claymont, DE	**Boring Location:**	12' North of Tank
Project Number:	2110876	**Total Depth (ft):**	4.0'
Date Started:	4/30/03	**Boring Diameter (in):**	2"
Date Finished:	4/30/03	**Water Level During Drilling (ft/bgs):**	NA
Drilling Company:	TerraProbe	**Weather Conditions:**	Clear, 70's
Drilling Method:	Geoprobe	**Logged By:**	S. Bouclier, Geologist



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Boring ID: SM17-GP04

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Project Name:	Honeywell-Claymont SWMU 17	**Sampling Method:**	Geoprobe Macrocore
Location:	Claymont, DE	**Boring Location:**	15' North of Tank
Project Number:	2110876	**Total Depth (ft):**	4.0'
Date Started:	4/30/03	**Boring Diameter (in):**	2"
Date Finished:	4/30/03	**Water Level During Drilling (ft/bgs):**	NA
Drilling Company:	TerraProbe	**Weather Conditions:**	Clear, 70's
Drilling Method:	Geoprobe	**Logged By:**	S. Bouclier, Geologist

Blow Counts	Recovery (inches)	PID Reading	Lithology	Geologic Description	Remarks
		15.2		ASPHALT: 0.0-0.7' Asphalt, some medium to coarse-grained gravel, dry.	
				SAND AND GRAVEL: 0.7-1.4' Brown, medium to coarse-grained SAND and GRAVEL, dry.	
		66.7		SILT: 1.4-2.0' Grayish brown with brown and black mottles, SILT, dry, moderately firm.	
	42"			SILT: 2.0-4.0' Greenish gray with black mottles, SILT, little clay, dry, moderately firm.	
		5.8			
		0.0			

0
-1
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-4

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Boring ID: SM17-GP05

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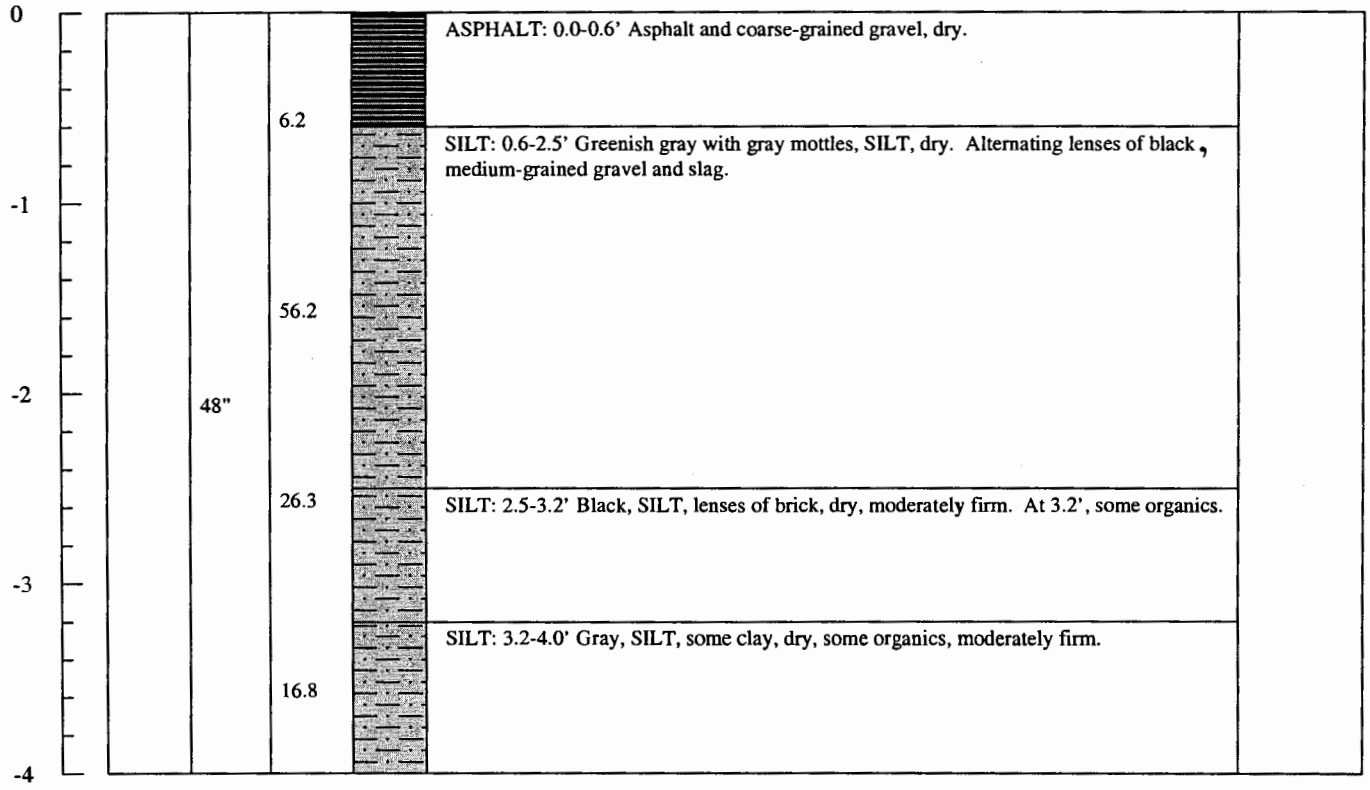
Project Name:	Honeywell-Claymont SWMU 17	**Sampling Method:**	Geoprobe Macrocore
Location:	Claymont, DE	**Boring Location:**	Northeast side of Tank
Project Number:	2110876	**Total Depth (ft):**	4.0'
Date Started:	4/30/03	**Boring Diameter (in):**	2"
Date Finished:	4/30/03	**Water Level During Drilling (ft/bgs):**	NA
Drilling Company:	TerraProbe	**Weather Conditions:**	Clear, 70's
Drilling Method:	Geoprobe	**Logged By:**	S. Bouclier, Geologist



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Boring ID: SM17-GP06

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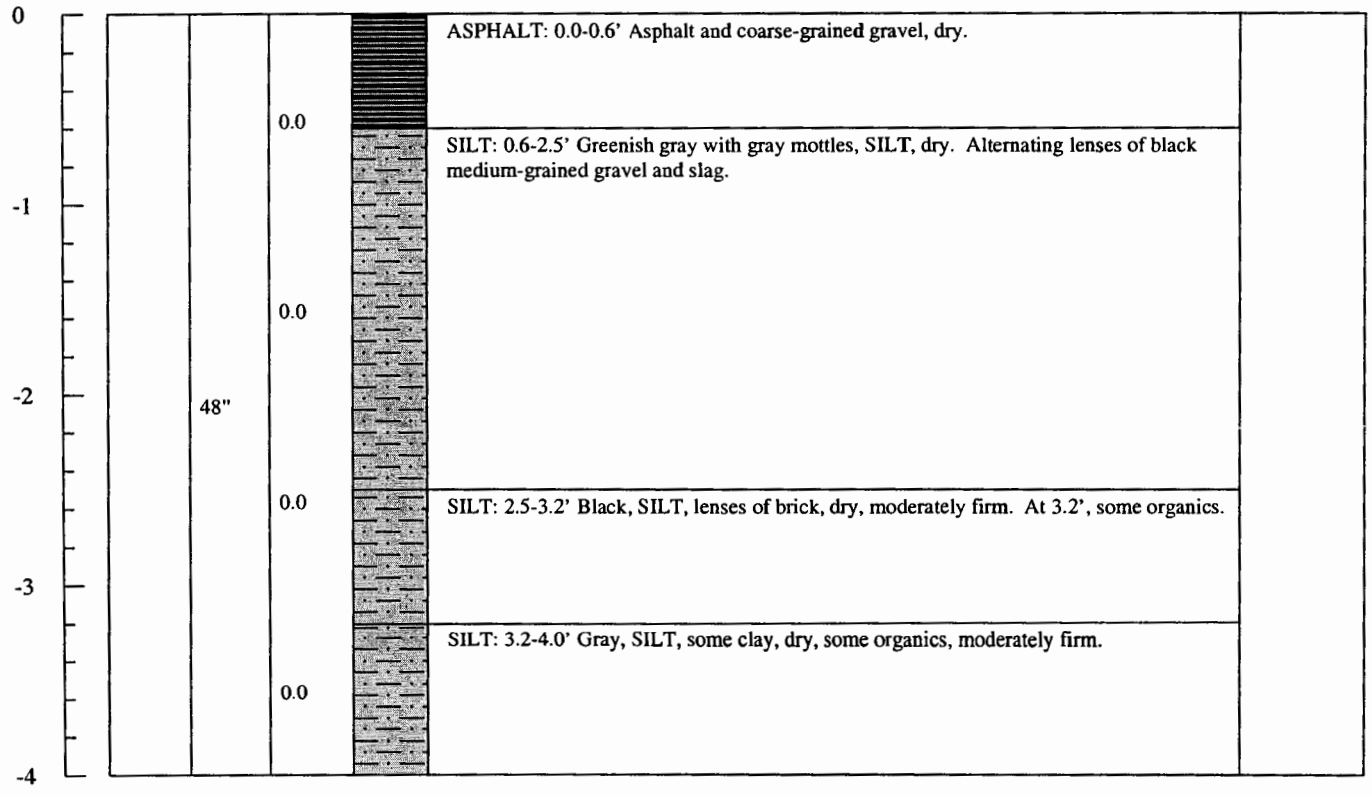
Project Name:	Honeywell-Claymont SWMU 17	**Sampling Method:**	Geoprobe Macrocore
Location:	Claymont, DE	**Boring Location:**	Northeast side of Tank
Project Number:	2110876	**Total Depth (ft):**	4.0'
Date Started:	4/30/03	**Boring Diameter (in):**	2"
Date Finished:	4/30/03	**Water Level During Drilling (ft/bgs):**	NA
Drilling Company:	TerraProbe	**Weather Conditions:**	Clear, 70's
Drilling Method:	Geoprobe	**Logged By:**	S. Bouclier, Geologist



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Boring ID: SM17-GP07

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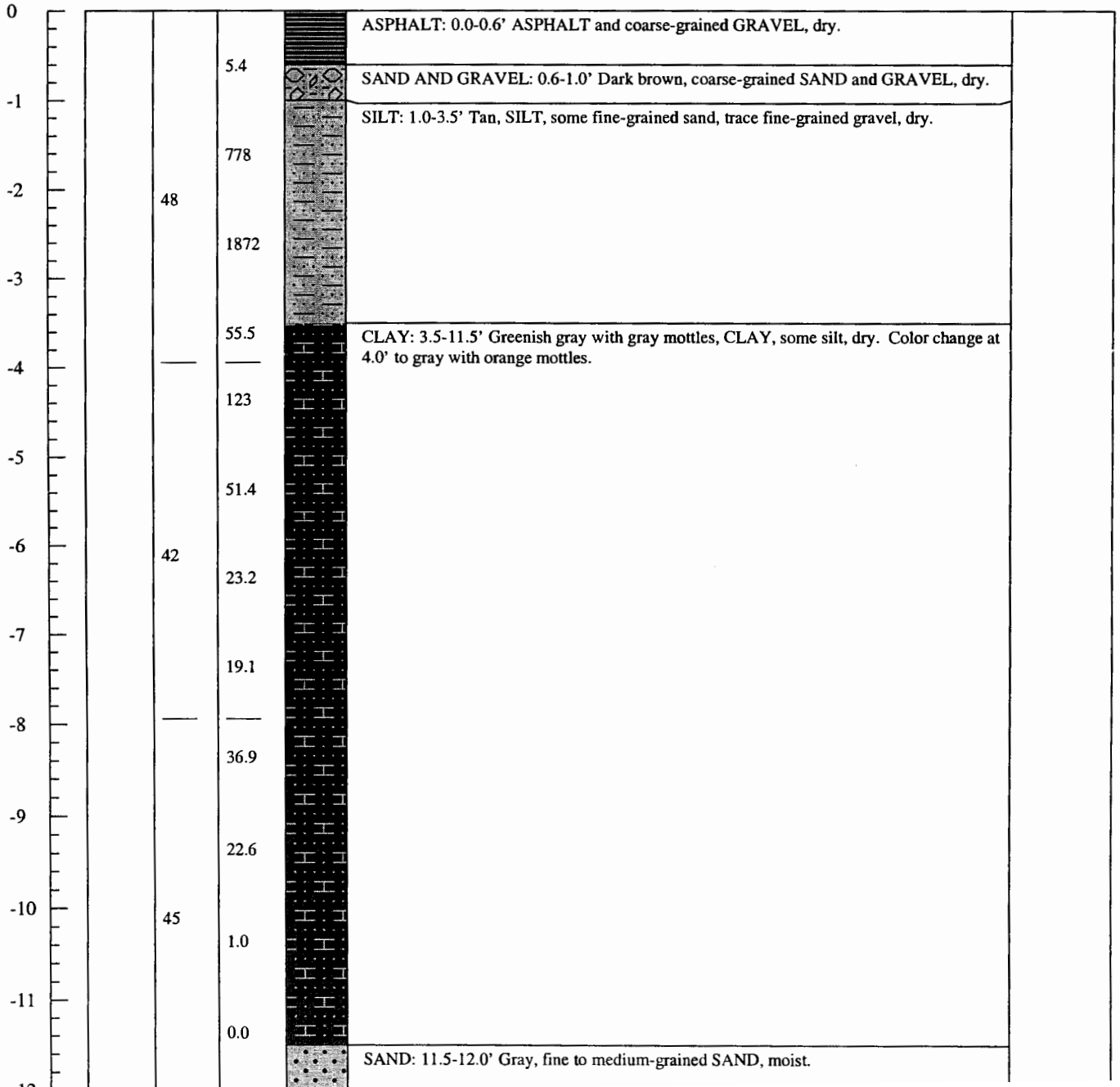
Project Name:	Honeywell-Claymont SWMU 17	**Sampling Method:**	Geoprobe Macrocore
Location:	Claymont, DE	**Boring Location:**	Northwest side of Tank
Project Number:	2110876	**Total Depth (ft):**	12'
Date Started:	4/30/03	**Boring Diameter (in):**	2"
Date Finished:	4/30/03	**Water Level During Drilling (ft/bgs):**	NA
Drilling Company:	TerraProbe	**Weather Conditions:**	Clear, 70's
Drilling Method:	Geoprobe	**Logged By:**	S. Bouclier, Geologist



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Boring ID: SM17-GP08

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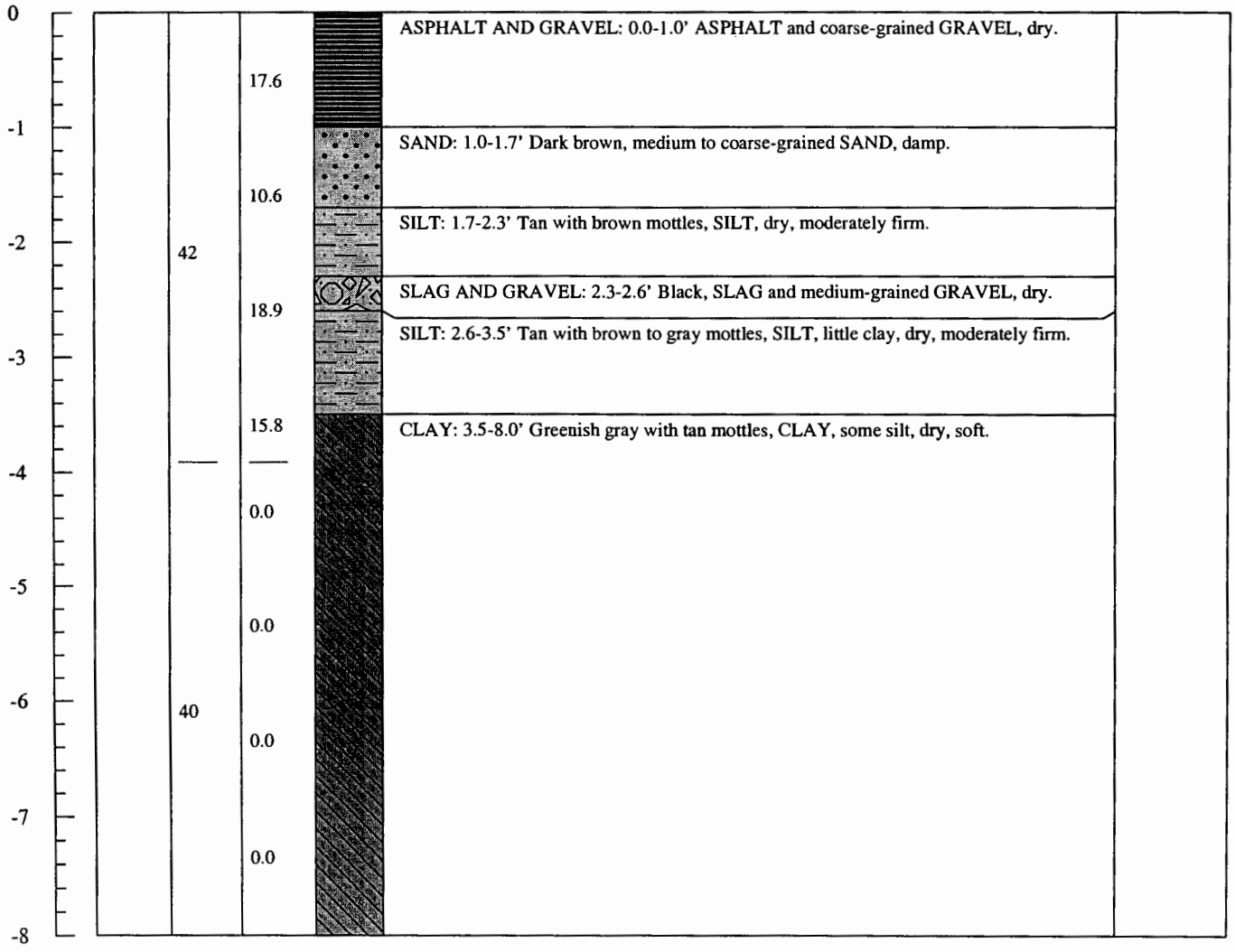
Project Name:	Honeywell-Claymont SWMU 17	**Sampling Method:**	Geoprobe Macrocore
Location:	Claymont, DE	**Boring Location:**	Northwest side of Tank
Project Number:	2110876	**Total Depth (ft):**	8.0'
Date Started:	4/30/03	**Boring Diameter (in):**	2"
Date Finished:	4/30/03	**Water Level During Drilling (ft/bgs):**	NA
Drilling Company:	TerraProbe	**Weather Conditions:**	Clear, 70's
Drilling Method:	Geoprobe	**Logged By:**	S. Bouclier, Geologist



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Boring ID: SM17-GP09

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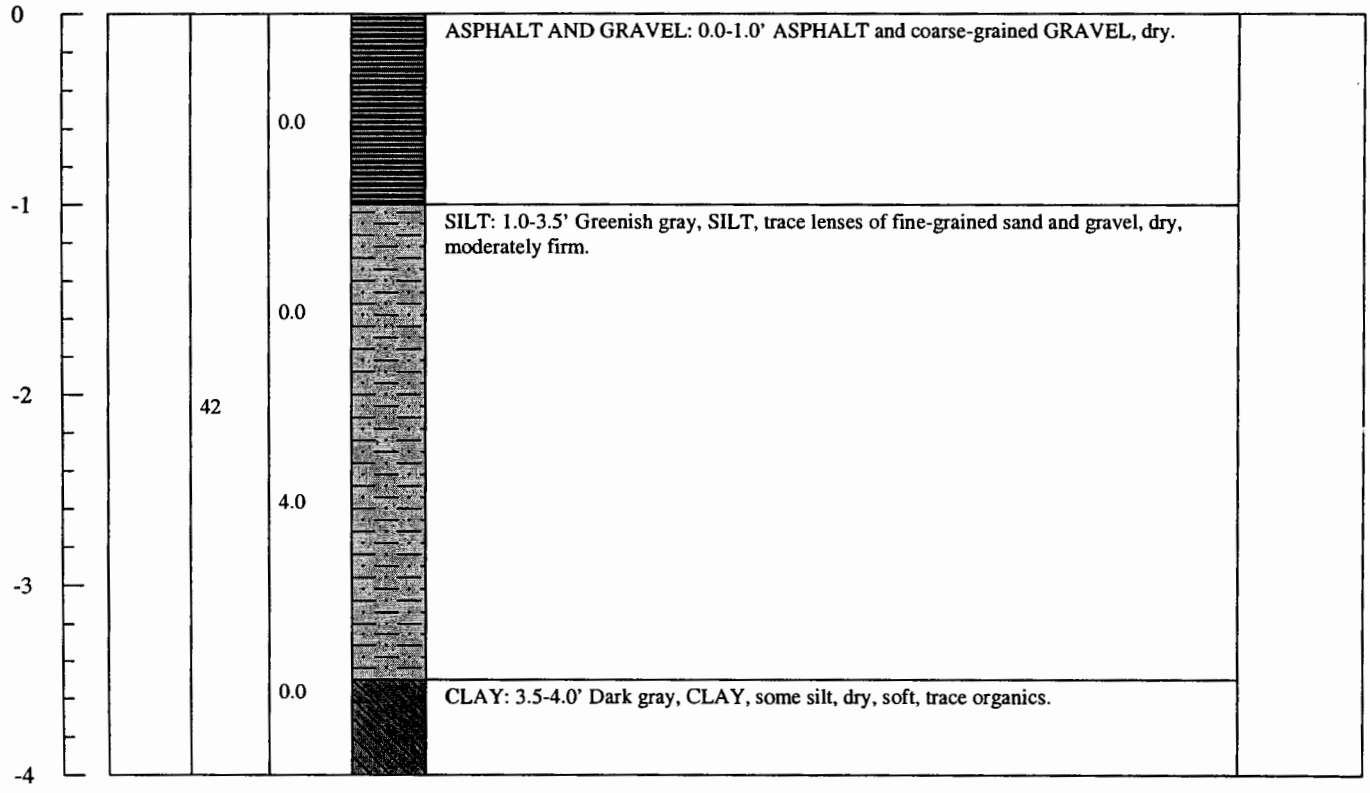
Project Name:	Honeywell-Claymont SWMU 17	**Sampling Method:**	Geoprobe Macrocore
Location:	Claymont, DE	**Boring Location:**	Northwest corner of stairs.
Project Number:	2110876	**Total Depth (ft):**	4.0
Date Started:	4/30/03	**Boring Diameter (in):**	2"
Date Finished:	4/30/03	**Water Level During Drilling (ft/bgs):**	NA
Drilling Company:	TerraProbe	**Weather Conditions:**	Clear, 70's
Drilling Method:	Geoprobe	**Logged By:**	S. Bouclier, Geologist



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Boring ID: SM17-GP10

Project Name:	Honeywell-Claymont SWMU 17	**Sampling Method:**	Geoprobe Macrocore
Location:	Claymont, DE	**Boring Location:**	2' South of Tank
Project Number:	2110876	**Total Depth (ft):**	12.0'
Date Started:	5/1/03	**Boring Diameter (in):**	2"
Date Finished:	5/1/03	**Water Level During Drilling (ft/bgs):**	NA
Drilling Company:	TerraProbe	**Weather Conditions:**	Clear, 70's
Drilling Method:	Geoprobe	**Logged By:**	S. Bouclier, Geologist

Blow Counts	Recovery (inches)	PID Reading	Lithology	Geologic Description	Remarks
		498		ASPHALT AND GRAVEL: 0.0-1.0' ASPHALT and coarse-grained GRAVEL, dry.	
		159		SAND AND GRAVEL: 1.0-2.0' Medium brown, medium to coarse-grained SAND and GRAVEL, damp.	
	48			SILT: 2.0-2.5' Tan with gray to black mottles, SILT, trace clay, dry.	
		130		SILT: 2.5-3.7' Greenish gray, SILT, trace to little clay, dry, little organics. Interbedded layers of black silt with little to some clay.	
		484		CLAY: 3.7-8.0' Gray with tan and dark gray mottles, CLAY, some silt, dry, soft.	
		36.2			
		56.5			
	48	155			
		48.2			
		132		SILT: 8.0-11.0' Light gray with dark gray mottles, SILT, little clay, dry, firm.	
		92.6			
	48	311			
		0.0		SAND: 11.0-12.0' Dark gray to black, fine to medium-grained SAND, moist.	

0 -1 -2 -3 -4 -5 -6 -7 -8 -9 -10 -11

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Boring ID: SM17-GP11

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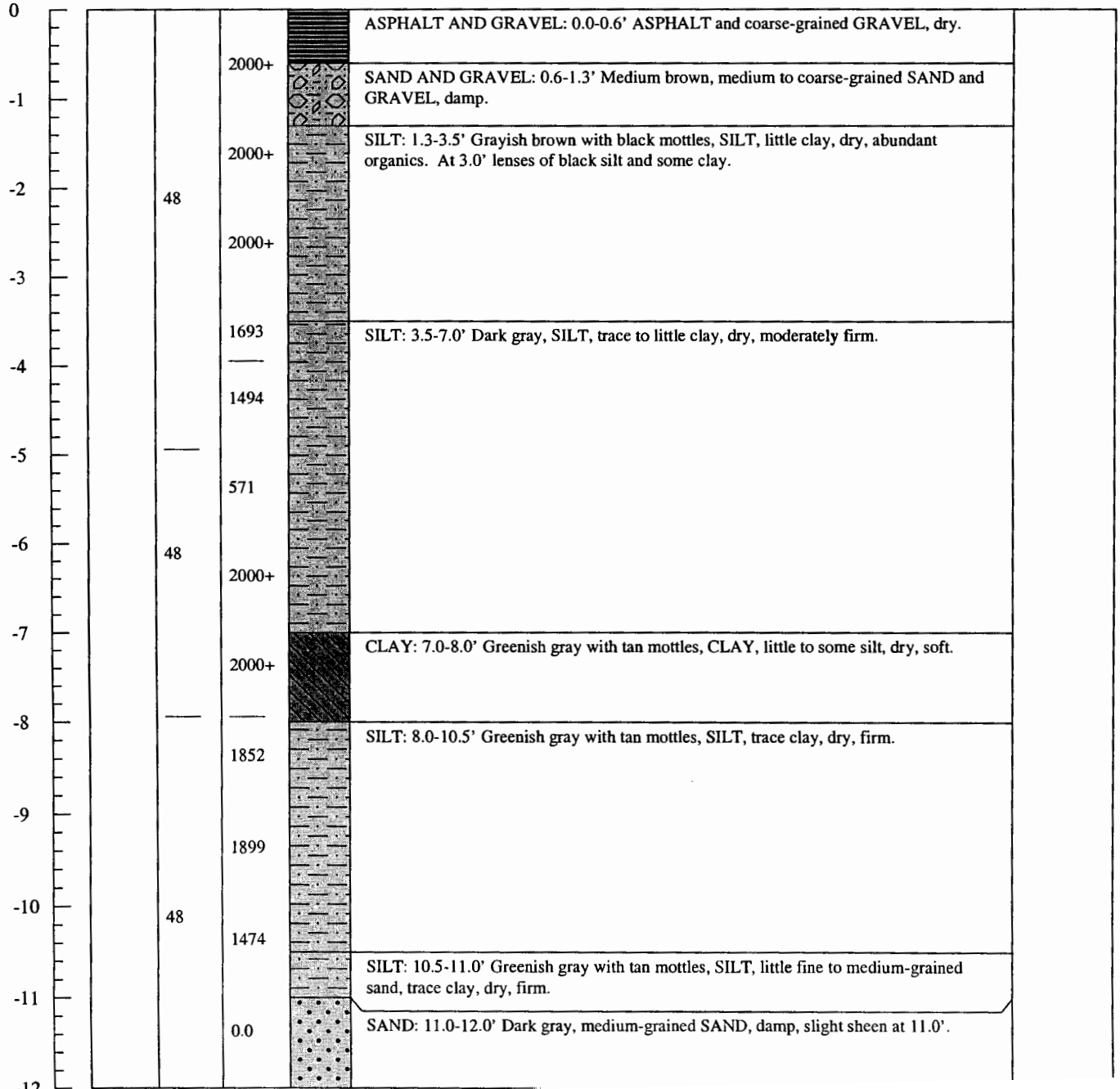
Project Name:	Honeywell-Claymont SWMU 17	**Sampling Method:**	Geoprobe Macrocore
Location:	Claymont, DE	**Boring Location:**	8' South of Tank
Project Number:	2110876	**Total Depth (ft):**	12.0'
Date Started:	5/1/03	**Boring Diameter (in):**	2"
Date Finished:	5/1/03	**Water Level During Drilling (ft/bgs):**	NA
Drilling Company:	TerraProbe	**Weather Conditions:**	Clear, 70's
Drilling Method:	Geoprobe	**Logged By:**	S. Bouclier, Geologist



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Boring ID: SM17-GP12

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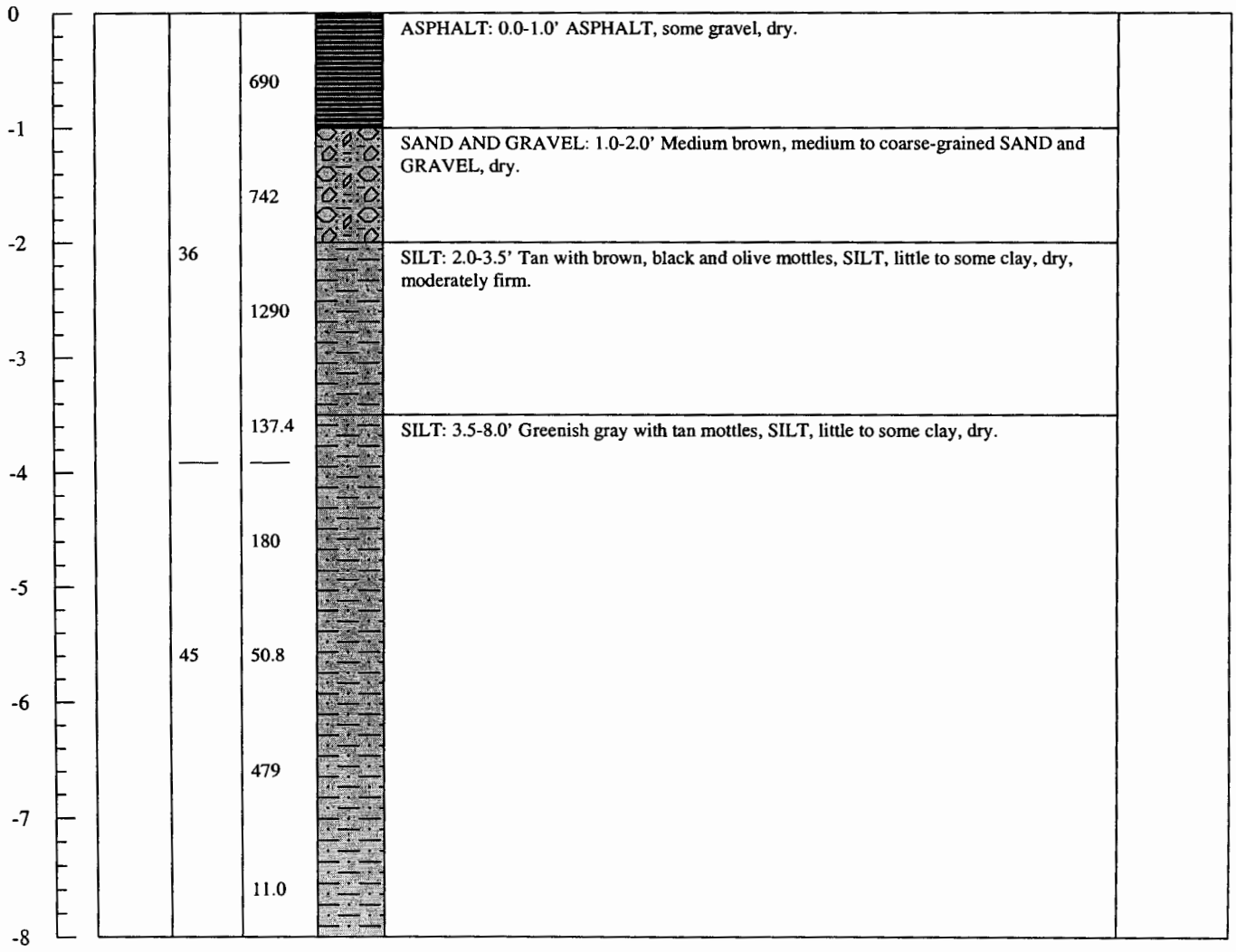
Project Name:	Honeywell-Claymont SWMU 17	**Sampling Method:**	Geoprobe Macrocore
Location:	Claymont, DE	**Boring Location:**	13' South of Tank
Project Number:	2110876	**Total Depth (ft):**	8.0'
Date Started:	5/1/03	**Boring Diameter (in):**	2"
Date Finished:	5/1/03	**Water Level During Drilling (ft/bgs):**	NA
Drilling Company:	TerraProbe	**Weather Conditions:**	Clear, 70's
Drilling Method:	Geoprobe	**Logged By:**	S. Bouclier, Geologist



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Boring ID: SM17-GP13

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Project Name:	Honeywell-Claymont SWMU 17	**Sampling Method:**	Geoprobe Macrocore
Location:	Claymont, DE	**Boring Location:**	18' South of Tank
Project Number:	2110876	**Total Depth (ft):**	12'
Date Started:	5/1/03	**Boring Diameter (in):**	2"
Date Finished:	5/1/03	**Water Level During Drilling (ft/bgs):**	NA
Drilling Company:	TerraProbe	**Weather Conditions:**	Clear, 70's
Drilling Method:	Geoprobe	**Logged By:**	S. Bouclier, Geologist

Blow Counts	Recovery (inches)	PID Reading	Lithology	Geologic Description	Remarks
		0.0		ASPHALT: 0.0-0.6' ASPHALT and coarse-grained GRAVEL, dry.	
				SAND AND GRAVEL: 0.6-1.0' Medium brown, medium to coarse-grained SAND and GRAVEL, dry.	
		5.9		SILT: 1.0-3.0' Dark greenish gray with black mottles, SILT, little clay, firm, dry.	
	40	56.4			
		34.1		CLAY: 3.0-4.0' Dark gray to black with light gray mottles, CLAY, trace silt, dry, soft.	
		38.2		CLAY: 4.0-8.5' Greenish gray with tan mottles, CLAY, trace silt, dry, soft.	
		50.8			
	38	14.3			
		156			
		0.0		SILT: 8.5-10.5' Light tan gray mottles, SILT, trace clay, dry, firm. Red mottles from 9.0' to 9.5'.	
		0.0			
	42	0.0			
		0.0		SILT: 10.5-11.0' Grayish brown, SILT, little clay, trace fine to medium-grained SAND, moist, firm.	
				SAND: 11.0-12.0' Black to dark gray, fine to medium-grained SAND, little silt, moist to wet.	

0 -1 -2 -3 -4 -5 -6 -7 -8 -9 -10 -11 -12

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Boring ID: SM17-GP14

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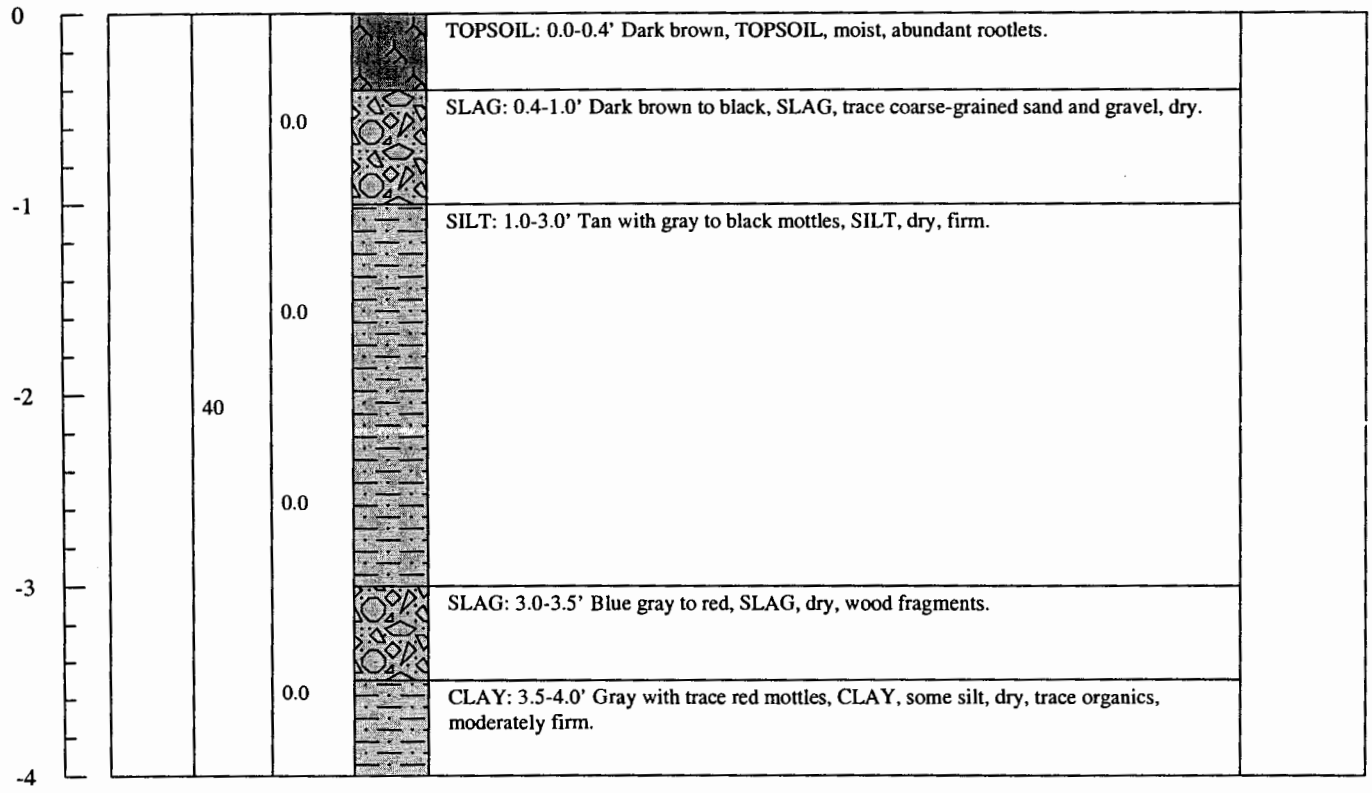
Project Name:	Honeywell-Claymont SWMU 17	**Sampling Method:**	Geoprobe Macrocore
Location:	Claymont, DE	**Boring Location:**	23' South of Tank
Project Number:	2110876	**Total Depth (ft):**	4.0'
Date Started:	5/1/03	**Boring Diameter (in):**	2"
Date Finished:	5/1/03	**Water Level During Drilling (ft/bgs):**	NA
Drilling Company:	TerraProbe	**Weather Conditions:**	Clear, 70's
Drilling Method:	Geoprobe	**Logged By:**	S. Bouclier, Geologist



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Boring ID: SM17-GP15

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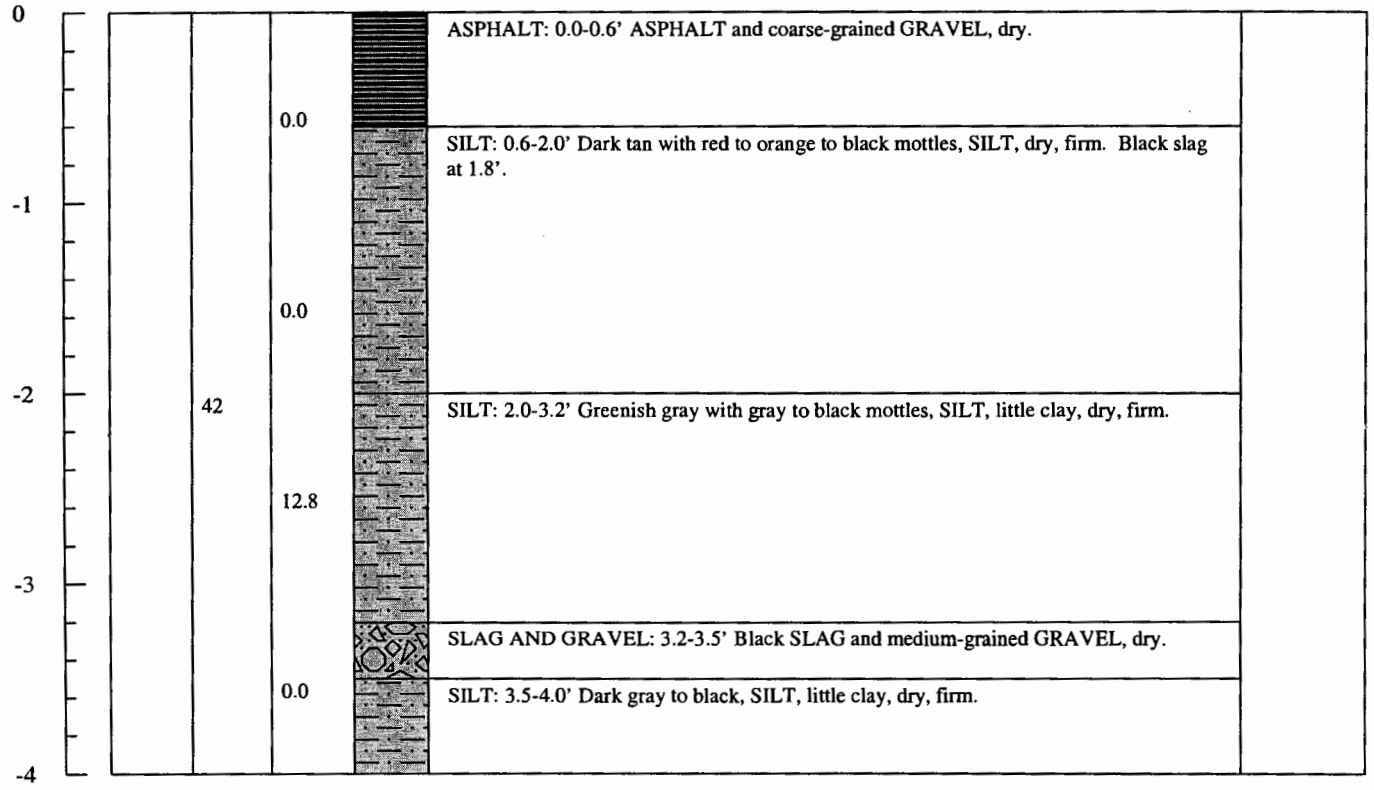
Project Name:	Honeywell-Claymont SWMU 17	**Sampling Method:**	Geoprobe Macrocore
Location:	Claymont, DE	**Boring Location:**	Southeast side of Tank
Project Number:	2110876	**Total Depth (ft):**	4.0'
Date Started:	5/1/03	**Boring Diameter (in):**	2"
Date Finished:	5/1/03	**Water Level During Drilling (ft/bgs):**	NA
Drilling Company:	TerraProbe	**Weather Conditions:**	Clear, 70's
Drilling Method:	Geoprobe	**Logged By:**	S. Bouclier, Geologist



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Boring ID: SM17-GP16

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Project Name:	Honeywell-Claymont SWMU 17	**Sampling Method:**	Geoprobe Macrocore
Location:	Claymont, DE	**Boring Location:**	Southwest side of Tank
Project Number:	2110876	**Total Depth (ft):**	12'
Date Started:	5/1/03	**Boring Diameter (in):**	2"
Date Finished:	5/1/03	**Water Level During Drilling (ft/bgs):**	NA
Drilling Company:	TerraProbe	**Weather Conditions:**	Clear, 70's
Drilling Method:	Geoprobe	**Logged By:**	S. Bouclier, Geologist

Blow Counts	Recovery (inches)	PID Reading	Lithology	Geologic Description	Remarks
		2000+		ASPHALT AND GRAVEL: 0.0-1.0' ASPHALT and coarse-grained GRAVEL, dry.	
		2000+		SILT: 1.0-4.0' Dark tan with red to orange to black mottles, SILT, dry, firm. Black slag at 1.8'.	
	42	962			
		382			
		2000+		CLAY: 4.0-8.0' Gray with tan to orange mottles, CLAY, little silt, damp, firm.	
		1307			
	42	476			
		1985			
		864		SILT: 8.0-11.0' Light orange with gray mottles, SILT, trace to little clay, moist, firm.	
		701			
	42	163			
		3.1		SAND: 11.0-11.8' Light orange with gray mottles, fine-grained SAND, little silt, wet.	
				SAND: 11.8-12.0' Black, fine-grained SAND, little silt, wet.	

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Boring ID: SM17-GP17

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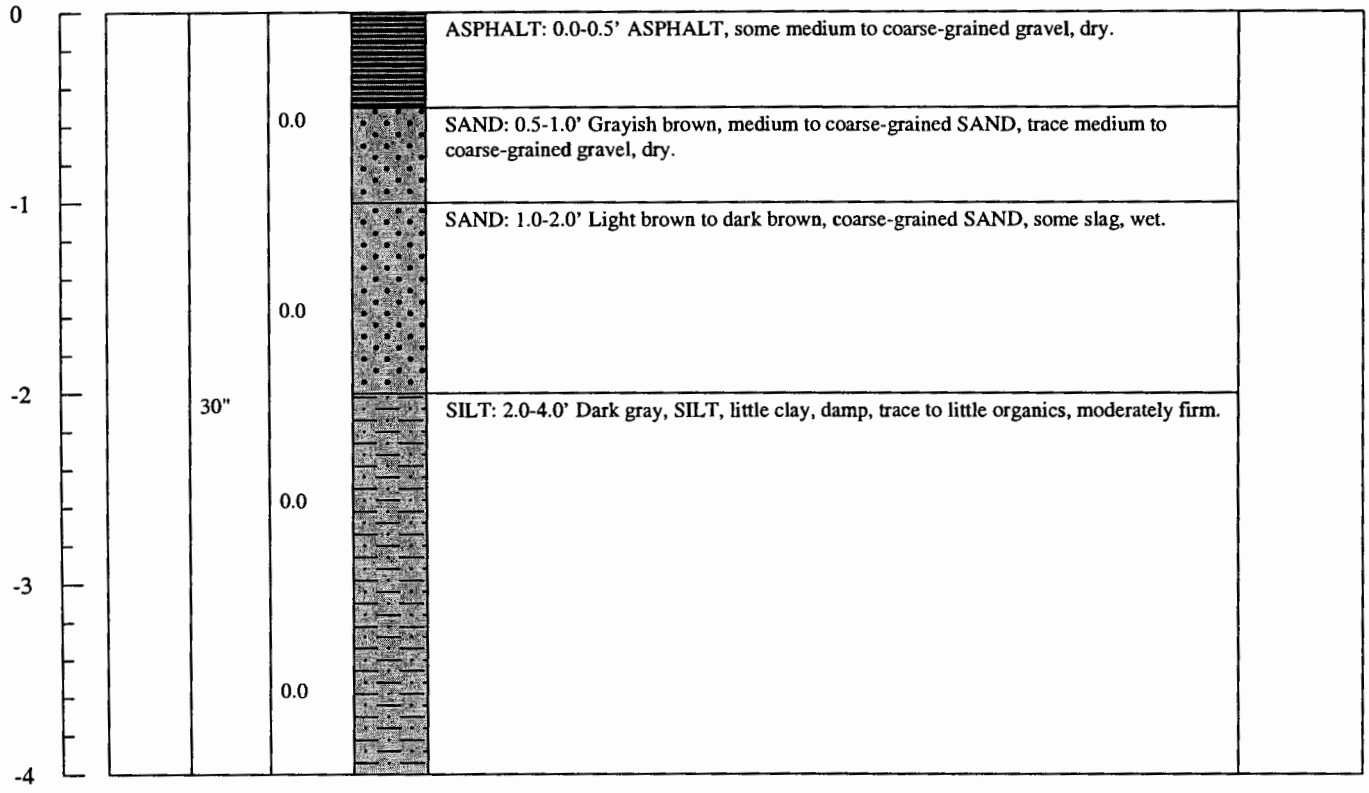
Project Name:	Honeywell-Claymont SWMU 17	**Sampling Method:**	Geoprobe Macrocore
Location:	Claymont, DE	**Boring Location:**	Southwest of Tank
Project Number:	2110876	**Total Depth (ft):**	4.0'
Date Started:	5/1/03	**Boring Diameter (in):**	2"
Date Finished:	5/1/03	**Water Level During Drilling (ft/bgs):**	NA
Drilling Company:	TerraProbe	**Weather Conditions:**	Overcast, 70's
Drilling Method:	Geoprobe	**Logged By:**	S. Bouclier, Geologist



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Test Pit ID:SM18-TP01

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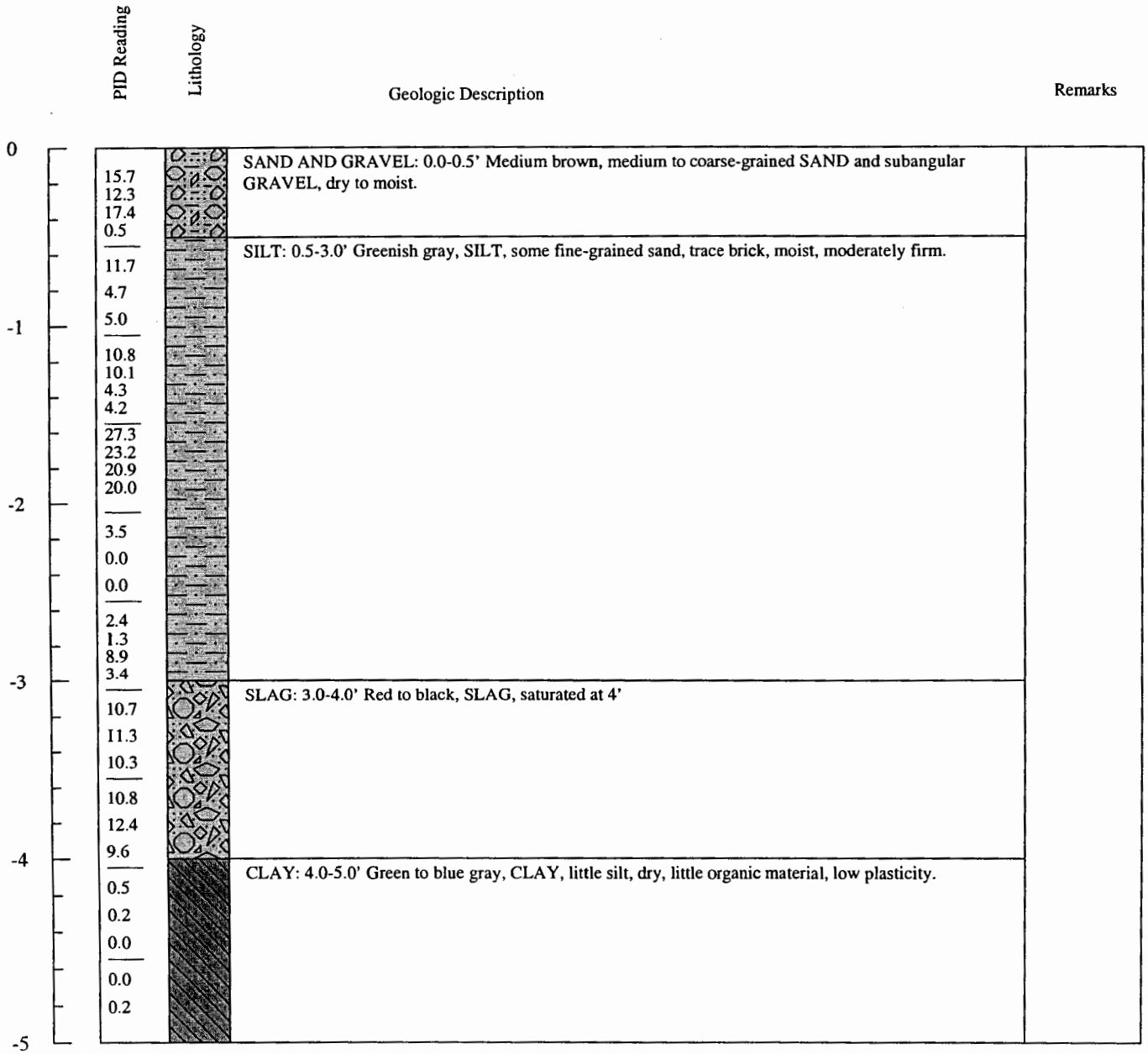
Project Name:	Honeywell-Claymont	**Sampling Method:**	Backhoe Bucket
Location:	Claymont, DE	**Test Pit Location:**	Northern perimeter of geophysics boundary
Project Number:	2110876	**Total Depth (ft):**	5.0'
Date Started:	4/22/03	**Water Level During Drilling (ft/bgs):**	NA
Date Finished:	4/22/03	**Weather Conditions:**	Overcast, 50's
Drilling Company:	Lewis Environmental	**Logged By:**	S. Bouclier, Geologist
Drilling Method:	Backhoe		



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Test Pit ID:SM18-TP02

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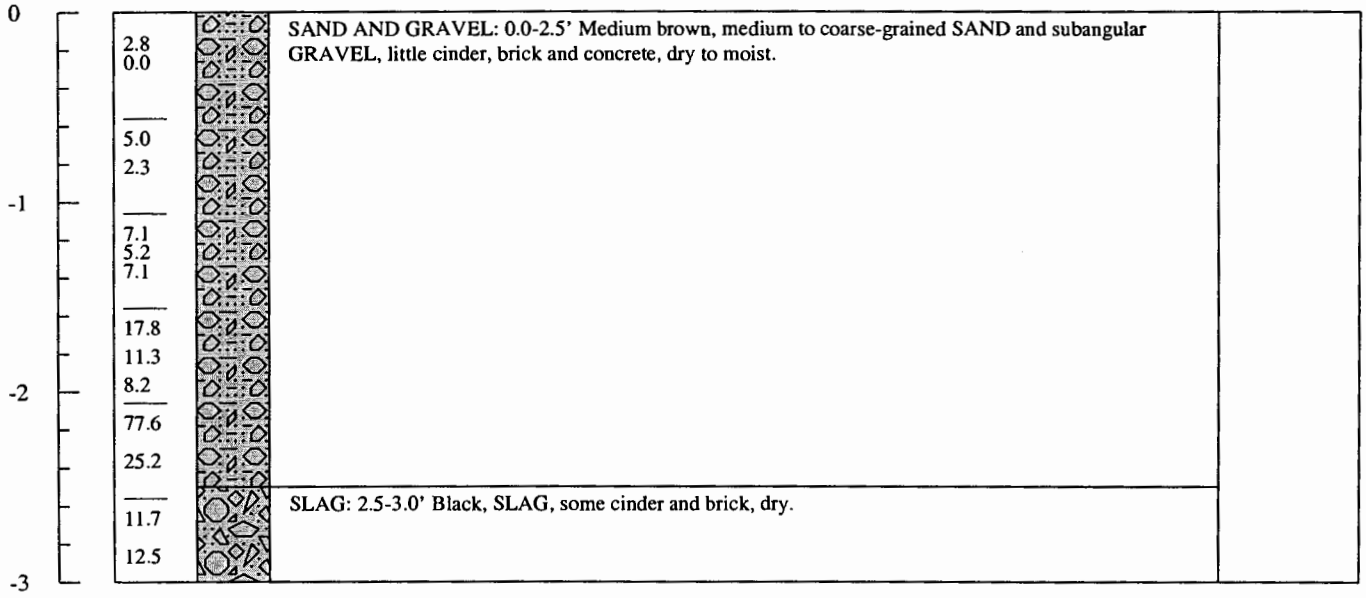
Project Name:	Honeywell-Claymont	**Sampling Method:**	Backhoe Bucket
Location:	Claymont, DE	**Test Pit Location:**	Western Perimeter towards boneyard
Project Number:	2110876	**Total Depth (ft):**	3.0'
Date Started:	4/22/03	**Water Level During Drilling (ft/bgs):**	NA
Date Finished:	4/22/03	**Weather Conditions:**	Overcast, 50's
Drilling Company:	Lewis Environmental	**Logged By:**	S. Bouclier, Geologist
Drilling Method:	Backhoe		



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Test Pit ID:SM18-TP03

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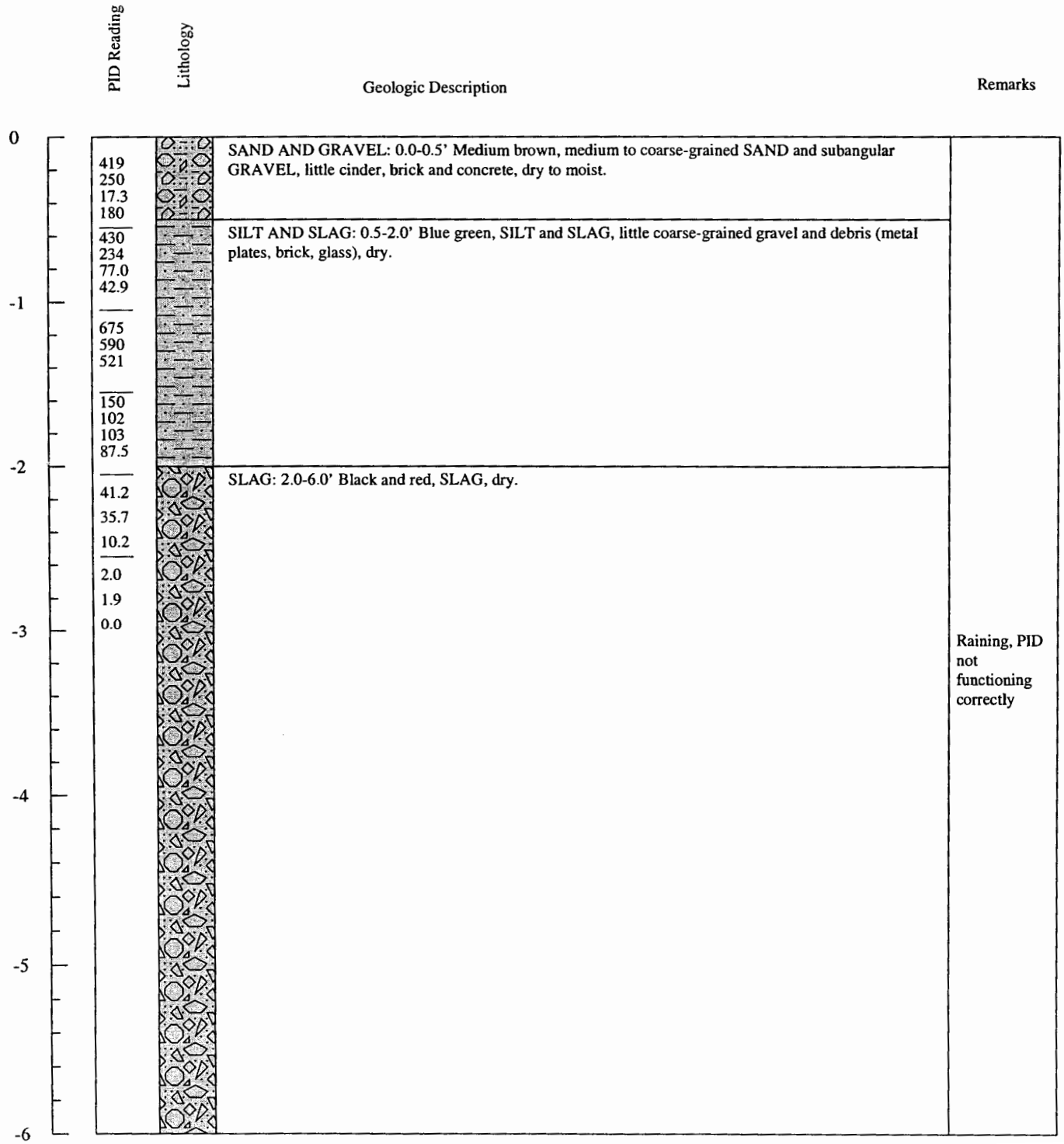
Project Name:	Honeywell-Claymont	**Sampling Method:**	Backhoe Bucket
Location:	Claymont, DE	**Test Pit Location:**	Western Perimeter towards boneyard
Project Number:	2110876	**Total Depth (ft):**	6.0'
Date Started:	4/22/03	**Water Level During Drilling (ft/bgs):**	NA
Date Finished:	4/22/03	**Weather Conditions:**	Rain, 50's
Drilling Company:	Lewis Environmental	**Logged By:**	S. Bouclier, Geologist
Drilling Method:	Backhoe		



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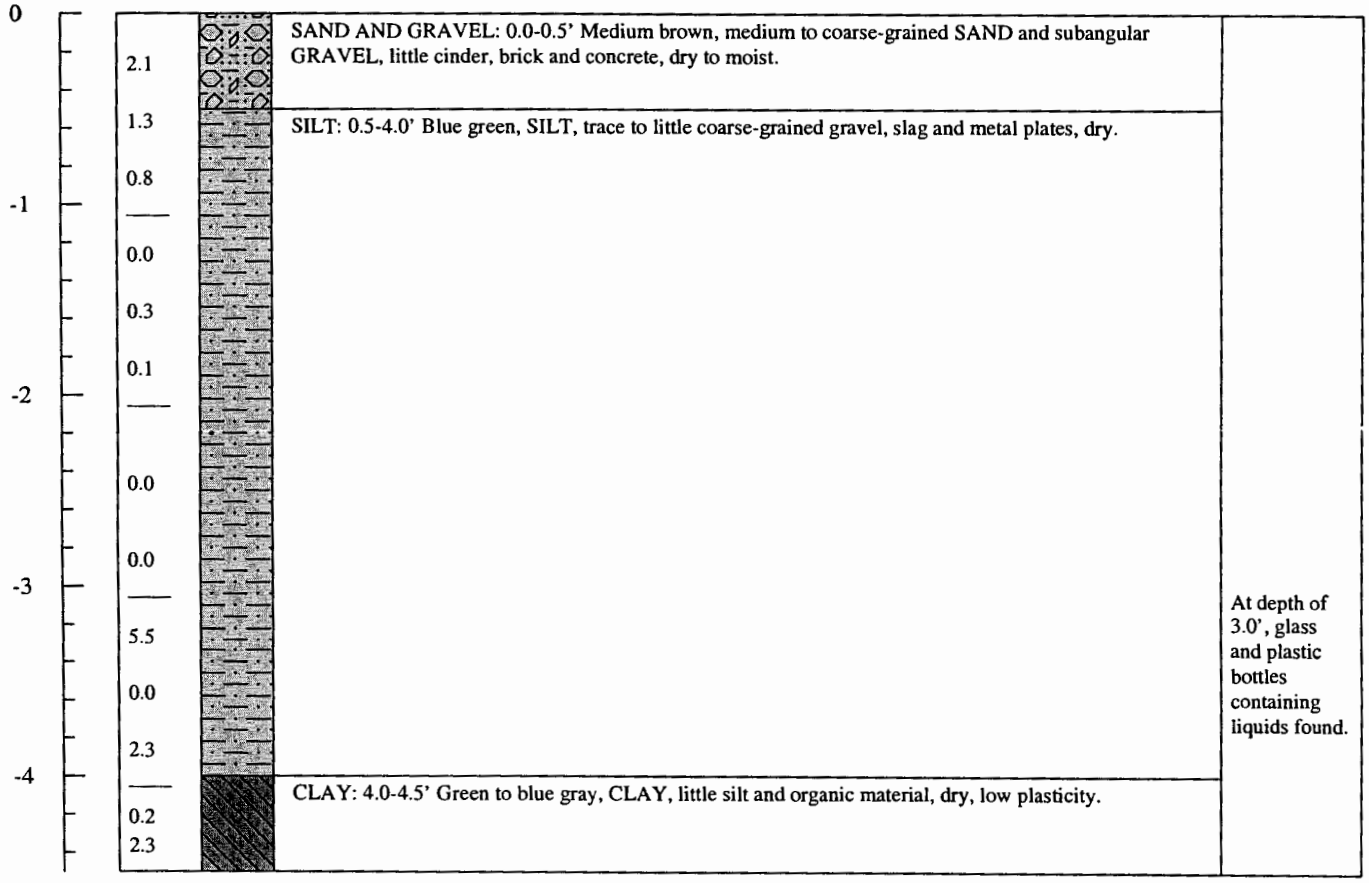
Test Pit ID:SM18-TP04

Project Name:	Honeywell-Claymont	**Sampling Method:**	Backhoe Bucket
Location:	Claymont, DE	**Test Pit Location:**	Continuation of TP-02
Project Number:	2110876	**Total Depth (ft):**	4.5'
Date Started:	4/23/03	**Water Level During Drilling (ft/bgs):**	NA
Date Finished:	4/23/03	**Weather Conditions:**	Overcast, 50's
Drilling Company:	Lewis Environmental	**Logged By:**	S. Bouclier, Geologist
Drilling Method:	Backhoe		



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Test Pit ID:SM19-TP01

Project Name:	Honeywell-Claymont	**Sampling Method:**	Backhoe Bucket
Location:	Claymont, DE	**Test Pit Location:**	Next to utility poles
Project Number:	2110876	**Total Depth (ft):**	3.2'
Date Started:	4/16/03	**Water Level During Drilling (ft/bgs):**	NA
Date Finished:	4/16/03	**Weather Conditions:**	Clear, 80's
Drilling Company:	Lewis Environmental	**Logged By:**	S. Bouclier, Geologist
Drilling Method:	Backhoe		

	PID Reading	Lithology	Geologic Description	Remarks
0	45.7 63.3 5.4 44.4		SAND AND GRAVEL: 0.0-0.5' Dark brown, medium to coarse-grained SAND and subangular GRAVEL, little oxidation, lenses of clayey silt and trace bricks, dry.	
	180 45.4 63.8 168		SILT: 0.5-1.0' Grayish brown, SILT, little clay and brick, dry, firm.	
-1	42.7 35.3 5.7 14.9 188 205 595 642		SAND: 1.0-2.75' Black to dark brown, medium to coarse-grained SAND, some grayish brown silt and brick, little clay, trace to little slag, glass and wood, moist to saturated at 2.5'.	
-2	94.7 132 54.6 38.3 334 134			
	95.2 165		SILT: 2.75-3.2' Light gray to dark gray with white and brown mottles, SILT, little clay, dry.	
-3	22.7			

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Test Pit ID:SM19-TP02

Project Name:	Honeywell-Claymont	**Sampling Method:**	Backhoe Bucket
Location:	Claymont, DE	**Test Pit Location:**	Next to Railroad tracks
Project Number:	2110876	**Total Depth (ft):**	2.5'
Date Started:	4/16/03	**Water Level During Drilling (ft/bgs):**	NA
Date Finished:	4/16/03	**Weather Conditions:**	Clear, 80's
Drilling Company:	Lewis Environmental	**Logged By:**	S. Bouclier, Geologist
Drilling Method:	Backhoe		

	PID Reading	Lithology	Geologic Description	Remarks
0	11.0 6.5 3.4 0.0 19.2 5.4 1.0 1.0		SAND AND GRAVEL: 0.0-1.0' Dark brown, medium to coarse-grained SAND and subangular GRAVEL, little to some gray silt with orange mottles, dry.	
-1	156 3.4 0.1 19.2 1569 167 18.8 13.3		SILT AND SAND: 1.0-2.0 Black, SILT and tan, medium to coarse-grained SAND, trace clay, moist to wet.	
-2	313 212 13.2 8.7		SILT: 2.0-2.5' Light gray to dark gray with white and brown mottles, SILT, little clay, dry.	

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Test Pit ID:SM19-TP03

Project Name:	Honeywell-Claymont	**Sampling Method:**	Backhoe Bucket
Location:	Claymont, DE	**Test Pit Location:**	Northern Perimeter of SWMU 19
Project Number:	2110876	**Total Depth (ft):**	2.3'
Date Started:	4/16/03	**Water Level During Drilling (ft/bgs):**	NA
Date Finished:	4/16/03	**Weather Conditions:**	Clear, 80's
Drilling Company:	Lewis Environmental	**Logged By:**	S. Bouclier, Geologist
Drilling Method:	Backhoe		

	PID Reading	Lithology	Geologic Description	Remarks
0	908 130 180 107 213 160 180 330		SAND AND GRAVEL: 0.0-1.0' Dark brown, medium to coarse-grained SAND and subangular GRAVEL, trace pink to white silt, dry.	
-1	1892 790 164 397 3342 1092 1082 790		SILT: 1.0-2.3' Light gray with white mottling, SILT, trace clay, dry, moderately firm.	
-2	556 487			

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Test Pit ID:SM19-TP04

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Project Name:	Honeywell-Claymont	**Sampling Method:**	Backhoe Bucket
Location:	Claymont, DE	**Test Pit Location:**	Center of SWMU 19
Project Number:	2110876	**Total Depth (ft):**	2.2'
Date Started:	4/16/03	**Water Level During Drilling (ft/bgs):**	NA
Date Finished:	4/16/03	**Weather Conditions:**	Clear, 80's
Drilling Company:	Lewis Environmental	**Logged By:**	S. Bouclier, Geologist
Drilling Method:	Backhoe		

	PID Reading	Lithology	Geologic Description	Remarks
0	760 804 668 109		SAND AND GRAVEL: 0.0-0.5' Dark brown, medium to coarse-grained SAND and subangular GRAVEL, dry.	
	515 518 601 510		SAND AND GRAVEL: 0.5-2.0' Dark brown, medium to coarse-grained SAND and GRAVEL, trace grayish green silt and orange medium to coarse-grained sand, wet at 1.0'.	
-1	420 314 107 634			
	634 2300 1192 878			At 1.5' concrete in northeastern corner of test pit.
-2	1209		SILT: 2.0-2.3' Gray, SILT, little clay, dry, firm.	

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Test Pit ID:SM19-TP05

Project Name:	Honeywell-Claymont	**Sampling Method:**	Backhoe Bucket
Location:	Claymont, DE	**Test Pit Location:**	Western Perimeter
Project Number:	2110876	**Total Depth (ft):**	2.7'
Date Started:	4/16/03	**Water Level During Drilling (ft/bgs):**	NA
Date Finished:	4/16/03	**Weather Conditions:**	Clear, 80's
Drilling Company:	Lewis Environmental	**Logged By:**	S. Bouclier, Geologist
Drilling Method:	Backhoe		

	PID Reading	Lithology	Geologic Description	Remarks
0	4.7 3.2 0.0 0.1 116 334 14.2 8.9		SAND AND GRAVEL: 0.0-1.0' Dark brown, medium to coarse-grained SAND and subangular GRAVEL, dry.	At 0.5' reinforced concrete on the western side of the testpit.
-1	13.7 4.8 10.2 4.6 114 234 1.7 0.8		SILT: 1.0-2.0' Greenish, yellowish gray with black and white mottles, SILT, trace clay, wet.	
-2	7.0 1.0 4.7 0.3 0.1		SILT: 2.0-2.7' Light gray with little black and white mottles, SILT, trace clay, dry.	

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Test Pit ID:SM20-TP01

Project Name:	Honeywell-Claymont	**Sampling Method:**	Backhoe Bucket
Location:	Claymont, DE	**Test Pit Location:**	Western Perimeter
Project Number:	2110876	**Total Depth (ft):**	1.5'
Date Started:	4/17/03	**Water Level During Drilling (ft/bgs):**	NA
Date Finished:	4/17/03	**Weather Conditions:**	Overcast, 40's
Drilling Company:	Lewis Environmental	**Logged By:**	S. Bouclier, Geologist
Drilling Method:	Backhoe		

	PID Reading	Lithology	Geologic Description	Remarks
0	1.0 0.8 0.3 0.7 0.0 0.3 0.3 0.0 0.0 0.5 0.3 0.0		SAND AND GRAVEL: 0.0-1.0' Medium brown, medium to coarse-grained SAND and subangular GRAVEL, dry.	Refusal at 1.5'. Concrete slab extending length of test pit.
-1				

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Project Name:	Honeywell-Claymont	**Sampling Method:**	Backhoe Bucket
Location:	Claymont, DE	**Test Pit Location:**	Between railroad tracks and concrete
Project Number:	2110876	**Total Depth (ft):**	5.8'
Date Started:	4/17/03	**Water Level During Drilling (ft/bgs):**	NA
Date Finished:	4/17/03	**Weather Conditions:**	Overcast, 40's
Drilling Company:	Lewis Environmental	**Logged By:**	S. Bouclier, Geologist
Drilling Method:	Backhoe		

PID Reading	Lithology	Geologic Description	Remarks
3.4, 0.0, 3.9, 0.0		SAND AND GRAVEL: 0.0-1.0' Medium brown, medium to coarse-grained SAND and subangular GRAVEL, trace brick from 0.5' to 1.0', dry, loose.	
1.4, 1.3, 1.9, 0.5, 1.9, 0.5, 1.8, 3.5		SILTY SAND: 1.0-2.0' Olive brown, fine to medium-grained SAND, some silt and fine to medium-grained gravel, dry.	At 1.5' deep, on the southern edge of test pit is the same concrete pad seen at SM20-TP01.
1.3, 0.6, 1.0, 1.2, 0.6, 0.8, 2.4, 5.4, 3.2, 0.0, 0.0, 0.0, 0.0, 0.0, 0.2, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0		SILT: 2.0-5.0' Olive brown, SILT, little clay and debris (slag, wood, brick, metal plates) trace fine-grained sand, dry, trace organic material.	
0.0, 0.0, 0.0, 0.0, 0.0, 0.0		SILT: 5.0-5.8' Grayish tan, SILT, little clay, dry, firm.	

0
-1
-2
-3
-4
-5

MWH Americas, Inc. 335 Phoenixville Pike Malvern, Pennsylvania 19355	**Test Pit ID:SM20-TP03** Page 1 of 1

Project Name:	Honeywell-Claymont	**Sampling Method:**	Backhoe Bucket
Location:	Claymont, DE	**Test Pit Location:**	Northeast corner of SWMU
Project Number:	2110876	**Total Depth (ft):**	6.0'
Date Started:	4/17/03	**Water Level During Drilling (ft/bgs):**	NA
Date Finished:	4/17/03	**Weather Conditions:**	Overcast, 40's
Drilling Company:	Lewis Environmental	**Logged By:**	S. Bouclier, Geologist
Drilling Method:	Backhoe		

PID Reading	Lithology	Geologic Description	Remarks
0.0 0.0		SAND AND GRAVEL: 0.0-1.0' Medium brown, medium to coarse-grained SAND and subangular GRAVEL, trace brick from 0.5' to 1.0', dry, loose.	
0.0 0.0 1.1 0.0 0.0 0.0 0.0 0.0 0.0 0.0 3.8 0.0 1.5 1.8 1.5 0.8 1.7 1.3 0.0 0.0 0.0 0.0		SILT: 1.0-2.0' Greenish gray, SILT, little to some clay, little fine to coarse-grained sand, abundant debris (slag, wood, coarse-grained subangular gravel, brick, pipe, railroad ties, ash and cinder), dry, moderately firm.	
0.0 0.0		SILT: 5.0-5.8' Grayish tan, SILT, little clay, dry, firm.	

0 -1 -2 -3 -4 -5 -6

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Test Pit ID:SM20-TP04

Project Name:	Honeywell-Claymont	**Sampling Method:**	Backhoe Bucket
Location:	Claymont, DE	**Test Pit Location:**	Next to railroad tracks
Project Number:	2110876	**Total Depth (ft):**	4.0'
Date Started:	4/21/03	**Water Level During Drilling (ft/bgs):**	NA
Date Finished:	4/21/03	**Weather Conditions:**	Overcast, 50's
Drilling Company:	Lewis Environmental	**Logged By:**	S. Bouclier, Geologist
Drilling Method:	Backhoe		

PID Reading	Lithology	Geologic Description	Remarks
0.0 0.0 0.0 0.0		SAND AND GRAVEL: 0.0-1.0' Medium brown, medium to coarse-grained SAND and subangular GRAVEL, trace brick from 0.5' to 1.0', dry, loose.	
2.7 1.8 0.2		SILT: 1.0-2.0' Greenish gray, SILT, little to some clay, little fine to coarse-grained sand, abundant debris (slag, wood, coarse-grained subangular gravel, brick, pipe, railroad ties, ash and cinder), dry, moderately firm.	
25.5 3.4 0.7 3.4 2.7 2.1 46.8 12.2 8.9 3.4 11.7 8.2 3.1 0.2		SILT: 5.0-5.8' Grayish tan, SILT, little clay, dry, firm.	

0
-1
-2
-3
-4

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Test Pit ID:SM20-TP05

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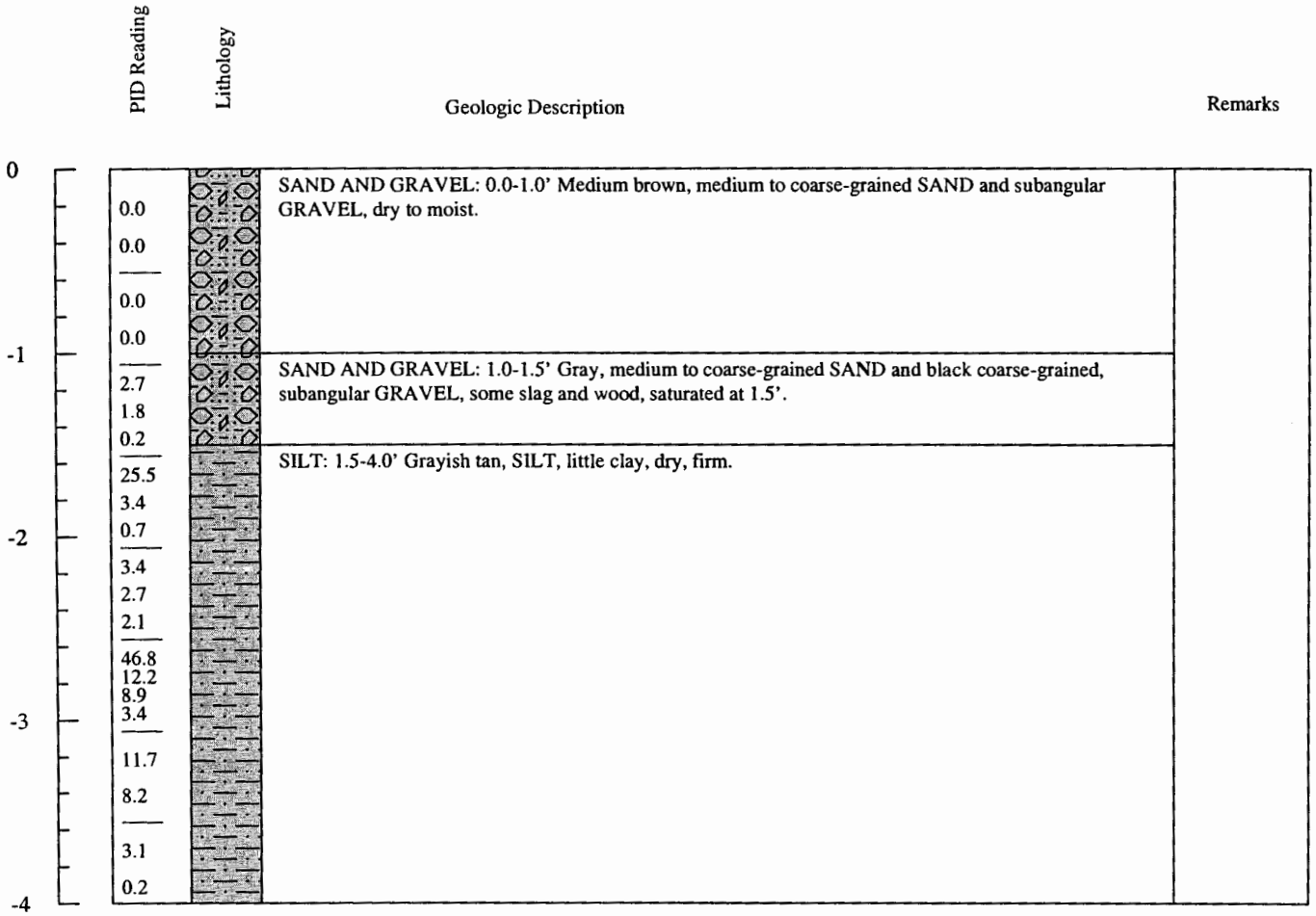
Project Name:	Honeywell-Claymont	**Sampling Method:**	Backhoe Bucket
Location:	Claymont, DE	**Test Pit Location:**	Next to Railroad tracks
Project Number:	2110876	**Total Depth (ft):**	4.0'
Date Started:	4/21/03	**Water Level During Drilling (ft/bgs):**	NA
Date Finished:	4/21/03	**Weather Conditions:**	Overcast, 50's
Drilling Company:	Lewis Environmental	**Logged By:**	S. Bouclier, Geologist
Drilling Method:	Backhoe		



APPENDIX D

MONITORING WELL LITHOLOGIC AND CONSTRUCTION LOGS

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Well ID: MW-1

Project Name:	Honeywell-Claymont
Location:	Claymont, DE
Project Number:	2110876
Date Started:	5/13/03
Date Finished:	5/13/03
Drilling Company:	Talon Drilling
Drilling Method:	HSA
Sampling Method:	Split Spoon

Boring Location:	Corner of SWMU 13 Parking Lot
Ground Elevation (ft/msl):	30.36'
Total Depth (ft):	20'
Boring Diameter (in):	4"
Water Level During Drilling (ft/bgs):	12'
Weather Conditions:	Rain, 60's
Logged By:	S. Bouclier, Geologist

Blow Counts	Recovery (inches)	PID Reading	Lithology	Geologic Description	Well Diagram	Remarks
		PID not working correctly		ASPHALT: 0.0-0.5' ASPHALT, dry.		Concrete pad to 1.0' bgs.
	NR			GRAVEL: 0.0-2.0' Black, medium to coarse-grained GRAVEL, dry.		6-inch steel casing to 1.0' bgs.
15				SILT: 2.0-4.5' Dark brown, SILT, some fine to medium-grained gravel and slag, dry.		
15						
15	13					Grout to 5.0' bgs.
12						
6						
8				SILT: 4.5-6.0' Dark greenish gray with gray and light brown mottles, SILT, trace clay, dry, firm, trace organics and mica flakes.		
7	14					
6						Bentonite chips from 5.0' to 7.0' bgs.
7				SILT: 6.0-7.5' Gray with light to dark gray mottles, SILT, little clay, moist, soft, moderate plasticity, trace mica.		
7						
8	16					2-inch PVC riser from 0.0 to 9.0'
12				SILT AND SAND: 7.5-12.0' Grayish tan, SILT and fine-grained SAND, moist, firm, trace mica. 2" thick lense of clay, silt and fine-grained sand at 11.5'. Saturated at 12.0'.		
8						
10						
12	14					
12						
6						#1 Sandpack from 7.0' to 20.0'
7						
8	12					
10						

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Well ID: MW-1

Blow Counts	Recovery (inches)	PID Reading	Sample Interval	Sample Interval	USCS Symbol	Lithology	Geologic Description	Well Diagram	Remarks
12							SILT AND SAND: 12.0-12.5' Grayish tan, SILT and fine-grained SAND, trace to little medium-grained gravel, trace clay, saturated, soft, trace mica.		2-inch 0.010 slot PVC screen from 9.0' to 19.0' bgs.
12									
23	24						SILT AND SAND: 12.5-15.5' Grayish tan with dark gray striations, SILT and fine-grained SAND, moist, firm, trace mica flakes.		
23									
27									
50/5"	6						SILT: 15.5-16.0' Olive green, SILT, some medium-grained gravel, dry.		
8							SAPROLITE: 16.0-20.0' White, dark gray and black, SAPROLITE, abundant mica, dry.		
6									
6	15								
10									
7									
8									
12	15								Total depth of borehole 20' bgs.
10									

-13 -14 -15 -16 -17 -18 -19 -20

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Well ID: MW-2

Project Name:	Honeywell-Claymont
Location:	Claymont, DE
Project Number:	2110876
Date Started:	5/12/03
Date Finished:	5/12/03
Drilling Company:	Talon Drilling
Drilling Method:	HSA
Sampling Method:	Split Spoon

Boring Location:	NE Corner of SWMU 15, near utility poles
Ground Elevation (ft/msl):	34.11'
Total Depth (ft):	16'
Boring Diameter (in):	4"
Water Level During Drilling (ft/bgs):	7'
Weather Conditions:	Showers, 60's
Logged By:	S. Bouclier, Geologist

Depth (ft)	Blow Counts	Recovery (inches)	PID Reading	Lithology	Geologic Description	Well Diagram	Remarks
0	5		0.0		SILT AND SAND: 0.0-0.6' Dark brown, SILT and medium-grained SAND, abundant organics, damp.		Concrete pad to 0.5' bgs.
-1	6	13	0.0		SILT: 0.6-8.0' Light brown to beige with black to beige mottles, SILT, trace brick, dry, firm. At 6.0' color change to beige with orange to deep red mottles. At 6.5' color change to grayish beige. At 7.0' saturated. At 7.2' color change to pink with beige to orangish red colored mottles.		6-inch steel casing to 1.0' bgs.
	6		0.0				
-2	4		0.0				Grout to 2.0' bgs.
	10						
	15						
-3	9	NR	NR				Bentonite chips from 2.0' to 3.5' bgs.
	5						
-4	3						
	3						2-inch PVC riser from 0.0 to 4.5' bgs.
-5	2	NR	NR				
	2						
-6	5						
	1		0.0				
-7	1	8					#1 Sandpack from 3.5' to 16.0' bgs.
	2		0.0				
-8	2		0.0		SILT: 8.0-13.0' Pink with beige to rusty colored mottles, SILT, little clay, damp, firm.		
	8		0.0				
-9	12	18	0.0				2-inch 0.010 slot PVC screen from 4.5' to 14.5' bgs.
	13		0.0				
-10	6		0.0				
	3		0.0				
-11	6	14	0.0				
	8						
-12	15		0.0				
	20		0.0				

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Well ID: MW-2

Blow Counts	Recovery (inches)	PID Reading	Sample Interval	Sample Interval	USCS Symbol	Lithology	Geologic Description	Well Diagram	Remarks
-13									
20	18	0.0					SILT: 13.0-13.5' Pinkish beige with orange to beige mottles, SILT, little fine to medium-grained sand, trace clay, damp, firm.		
23									
-14									
15		0.0					SAND: 13.5-15.0' Pinkish beige with orange to beige mottles, fine to medium-grained SAND, trace silt and mica, damp.		
18	14	0.0							
-15									
18		0.0					SAND: I5.0-16.0' Tan with rusty colored lenses, fine to medium-grained SAND, little to some fine to medium-grained gravel, little silt, trace mica, wet.		Total depth of borehole 16' bgs.
20									
-16									

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Well ID: MW-3

Project Name:	Honeywell-Claymont
Location:	Claymont, DE
Project Number:	2110876
Date Started:	5/12/03
Date Finished:	5/12/03
Drilling Company:	Talon Drilling
Drilling Method:	HSA
Sampling Method:	Split Spoon

Boring Location:	West of SWMU 18 in Boneyard
Ground Elevation (ft/msl):	30.97'
Total Depth (ft):	16'
Boring Diameter (in):	4"
Water Level During Drilling (ft/bgs):	10'
Weather Conditions:	Overcast, 70's
Logged By:	S. Bouclier, Geologist

Depth	Blow Counts	Recovery (inches)	PID Reading	Lithology	Geologic Description	Well Diagram	Remarks
0					ASPHALT: 0.0-0.5' ASPHALT, dry.		Concrete pad to 1.0' bgs.
-1		NR	NR		GRAVEL: 0.5-2.0' Black, medium to coarse-grained GRAVEL, dry.		6-inch steel casing to 1.0' bgs.
-2	10	16	0.0		CINDER AND ASH: 2.0-3.0' Black, CINDER and ASH, fill material, dry.		Grout to 2.5' bgs.
-3	9 8		0.0 0.0		SILT: 3.0-4.0' Medium gray with dark gray to light gray and orange mottles, SILT, little fine-grained sand, trace to little mica flakes, dry, firm. Lenses of 1" thick orange fine to medium-grained sand with gray mottles.		Bentonite chips from 2.5' to 4.5' bgs.
-4	8 4		0.0 0.0		SILT: 4.0-6.7' Medium gray with greenish brown mottles, SILT, little clay, trace mica, moist, firm.		2-inch PVC riser from 0.0 to 6.0' bgs.
-5	3 3	12	0.0 0.0				
-6	6 15		0.0 0.0				#1 Sandpack from 4.5' to 16.0' bgs.
-7	18 16	22	0.0 0.0		SILT: 6.7-7.7' Rusty brown with light gray mottles, SILT, trace clay, mica and fine-grained gravel.		
-8	23 8		0.0 0.0		SAND AND SILT: 7.7-10.0' Rusty brown with deep gray mottles, SILT and fine-grained SAND, trace mica, moist. Color change at 9' to light brownish gray with light gray mottles, wet.		
-9	12 15	12	0.0 0.0				2-inch 0.010 slot PVC screen from 6.0' to 16.0' bgs.
-10	8						

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Well ID: MW-3

Blow Counts	Recovery (inches)	PID Reading	Sample Interval	Sample Interval	USCS Symbol	Lithology	Geologic Description	Well Diagram	Remarks
4		0.0					SAND: 10.0-13.0' Rusty brown with deep gray mottles, fine-grained SAND, trace silt and mica, saturated. At 11.8' lense of silt.		
8	12	0.0							
-11 8		0.0							
8		0.0							
-12 3		0.0							
4	12	0.0							
-13 5		0.0					SAND: 13.0-13.5' Gray, fine to medium-grained SAND, trace mica flakes, saturated.		
7		0.0					SAND: 13.5-14.5' Gray, fine-grained SAND, trace medium-grained sand, trace mica flakes, saturated.		
-14 12		0.0							
14	14	0.0					SAND: 14.5-15.0' Medium gray, medium-grained SAND and GRAVEL, saturated, lenses of red medium-grained sand.		
-15 15		0.0					SAPROLITE: 15.0-16.0' White, dark gray, greenish beige, SAPROLITE, moist.		Total depth of borehole 16' bgs.
18		0.0							
-16									

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Well ID: MW-4

Project Name:	Honeywell-Claymont	**Boring Location:**	Behind Administrative Building
Location:	Claymont, DE	**State Permit Number**	193565W
Project Number:	2110876	**Ground Elevation (ft/msl):**	30.5'
Date Started:	5/13/03	**Total Depth (ft):**	20.0'
Date Finished:	5/13/03	**Boring Diameter (in):**	4"
Drilling Company:	Talon Drilling	**Water Level During Drilling (ft/bgs):**	12.5'
Drilling Method:	HSA	**Weather Conditions:**	Overcast, 70's
Sampling Method:	Split Spoon	**Logged By:**	S. Bouclier, Geologist

Depth (ft)	Blow Counts	Recovery (inches)	PID Reading
0 to -2	4, 8, 12, 9	13	0.0, 0.0, 0.0, 0.0
-2 to -4	12, 15, 15, 10	13	0.0, 0.0, 0.0, 0.0
-4 to -6	8, 4, 8, 12	12	0.0, 0.0, 0.0
-6 to -8	12, 12, 12, 15	16	0.0, 0.0, 0.0
-8 to -10	6, 10, 10, 10	17	0.0, 0.0, 0.0
-10 to -12	6, 7, 7, 8	8	0.0, 0.0, 0.0
-12	8		0.0

Lithology / Geologic Description

SILT AND SAND: 0.0-2.0' Medium brown, SILT and fine-grained SAND, trace mica, abundant rootlets, dry.

SILT: 2.0-7.0' Grayish tan with light gray to reddish orange mottles, SILT, trace clay and mica flakes, firm, dry. Moist from 4.0' to 4.5', dry at 4.5'.

SILT: 7.0-8.5' Tan with light gray to reddish orange mottles, SILT, trace mica, dry, firm. Striations of reddish orange colored silt.

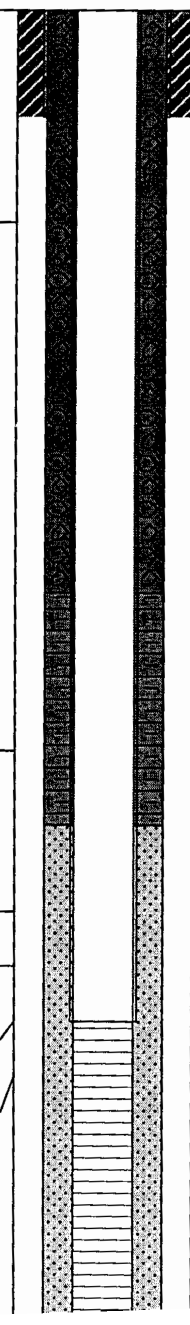
SILT: 8.5-9.0' Rose to tan with mottles, SILT, dry, firm.

SILT: 9.0-9.5' Tan with light gray to reddish orange mottles, SILT, trace mica, dry, firm.

SILT: 9.5-10.0' Tan with light gray to reddish orange mottles, SILT, trace clay and mica, damp.

SILT: 10.0-12.5' Tan with light gray to reddish orange mottles, SILT, little clay, trace mica, moist, soft.

Well Diagram



Remarks

Concrete pad to 1.0' bgs.

6-inch steel casing to 1.0' bgs.

Grout to 5.5' bgs.

2-inch PVC riser from 0.0 to 9.5' bgs.

Bentonite chips from 5.5' to 7.7' bgs.

2-inch 0.010 slot PVC screen from 9.5' to 19.5' bgs.

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Well ID: MW-4

Blow Counts	Recovery (inches)	PID Reading	Sample Interval	Sample Interval	USCS Symbol	Lithology	Geologic Description	Well Diagram	Remarks
8		0.0					SILT: 12.5-13.7' Tan with light gray to reddish orange mottles, SILT, little fine-grained sand, trace clay and mica flakes, wet at 12.5', soft.		
10	24	0.0							
10		0.0							
2		0.0					SILT AND SAND: 13.7-14.5' Medium brown to tan, fine-grained SILT and SAND, little mica, dry, firm.		#1 Sandpack from 7.7' to 19.5' bgs.
4							SILT AND SAND: 14.5-15.2' Medium gray, fine-grained SILT and SAND, little mica, trace clay, lenses of fine-grained sand and silt at 15.0', moist.		
10	16	0.0					SILT AND SAND: 15.2-15.5' Orangish tan, fine-grained SILT and SAND, little mica, moist.		
18							SAND: 15.5-16.0' Orangish tan, fine to medium-grained SAND, little silt and fine-grained gravel, moist, poorly sorted.		
15		0.0					SAND: 16.0-17.2' Orangish tan, fine to medium-grained SAND, little mica, trace fine-grained gravel, moist, poorly sorted.		
22		0.0					SAND: 17.2-18.2' Orangish tan, fine to medium-grained SAND, some medium to coarse-grained gravel, moist. Color change at 17.5' to dark grayish blue.		
25	20	0.0					SILT: 18.2-20.0' Dark brown, SILT, little clay and mica, trace fine-grained sand, moist, soft.		Total depth of borehole 19.5' bgs.
30		0.0							
5		0.0							
5		0.0							
5	24	0.0							
7		0.0							

-13 -14 -15 -16 -17 -18 -19 -20